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DAIRY-HERD TESTING IN NEW ZEALAND.

REVIEW OF THE 1928–29 SEASON.

Dairy Division.

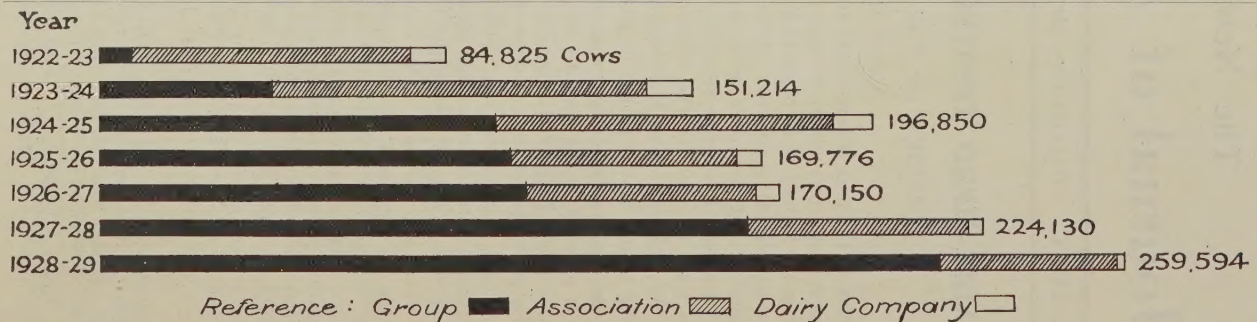
A STUDY of the past season's herd-testing indicates that during 1928–29 the movement received wider and more systematic support than ever before in the history of dairying in New Zealand. An analysis of returns shows that almost 95 per cent. of the data supplied to the Dairy Division for summarizing purposes was accurate and complete, pointing to methodical and intelligent recording, and in addition there was a very satisfactory increase in the total number of cows tested. Average yield, too, reached a very satisfactory figure, an exceptionally favourable dairying season having played its part in this respect.

Some 259,594 dairy cows were tested in 1928–29, as compared with 224,130 in 1927–28, an increase of 35,464. The animals tested represented 20·1 per cent. of the total of the Dominion's dairy cows in milk, or 18·9 per cent. of all cows—in milk and dry. Although, in retrospect, these percentages are evidence of considerable achievement—the 1919–20 tested cows having been only 4½ per cent. of the Dominion total—it would appear reasonable to hope for steady advancement for some years yet to come. However, one must not lose sight of the fact that as a general rule dairy-farmers do not test every cow every season, so that it is probable that the cows which can rightly be classed as tested cows—that is, cows which have been tested during at least one milking-period—would reach a substantial aggregate. Statistics of this nature are difficult to collect, but it is hoped that a means of putting the work in hand will be found before long.

The present survey follows the lines established by previous reviews, and readers who are interested will be able to make some useful comparisons by referring to the records published in *Journal* issues of earlier years. For the benefit of those who are not conversant with details of nomenclature as applied to herd-testing we may repeat the explanation that in New Zealand this work is carried out under several variants of our original method, and that three systems are now recognized—namely, "Association" (sometimes called "Individual"), "Group," and "Dairy Company." Under the Association system the members themselves do the weighing and sampling of the milk of their cows

Table 1.—Number of Cows tested Twice or more, classified according to Season and System of Testing.

System.	1924–25.			1925–26.			1926–27.			1927–28.			1928–29.		
	Organizations.	Cows.	Average Cows per Organization.	Organizations.	Cows.	Average Cows per Organization.	Organizations.	Cows.	Average Cows per Organization.	Organizations.	Cows.	Average Cows per Organization.	Organizations.	Cows.	Average Cows per Organization.
Association	117	87,695	750	124	59,345	479	116	56,823	489	115	56,699	493	99	45,586	460
Group ..	91	100,055	1,100	86	105,227	1,224	96	109,827	1,144	127	164,610	1,296	158	212,480	1,344
Dairy Company	51	9,100	178	38	5,204	137	28	3,500	125	18	2,821	157	8	1,528	191
All ..	259	196,850	760	248	169,776	685	240	170,150	709	260	224,130	862	265	259,594	979



GRAPHICAL REPRESENTATION OF EXTENT AND SYSTEMS OF HERD-TESTING IN NEW ZEALAND FOR LAST SEVEN SEASONS.

for two days (in a few cases one day) in every thirty days, while in the case of the Group system weighing and sampling of the milk for each cow on test is done by a testing officer for one day every month. In both cases samples are tested by testing officers, returns figured, and sheets containing results returned to the members. Testing under the Dairy Company system resembles the Association method, except that the testing of the samples is carried out by the dairy factory to which the members are suppliers, and the figuring of returns is left to the herd-owners themselves.

In Table 1 are given details of classification under these three systems for the past five years. The table clearly indicates that both the Association and the Dairy Company system are steadily losing ground, while the Group system is rapidly lengthening its list of supporters. The accompanying graph goes back to 1922–23, the first year of group testing in New Zealand, and affords an interesting representation of the progress of that system and of its tendency to take the place of the original Association system. Not only are there more groups and more cows, but more cows per group than ever before.

Table 2 supplies an indication of the number of cows tested in the various land districts, and, similarly to Table 1, covers a period of five seasons. It is pleasing to note that every land district except one—Otago—has experienced an increase. This statement does not include Westland, from which no systematic testing of dairy herds was reported. The latest available statistics show that Westland has some 11,000 dairy cows in milk, and that it has twelve dairy factories with 698 suppliers. It would therefore seem that there is room for several fairly strong herd-testing organizations on the West Coast. It will be noticed that there has been a satisfactory revival of interest in both Nelson and Marlborough, while the South Island as a whole has shown a greater increase than has hitherto been experienced.

Table 2.—Number of Cows tested Twice or more, classified according to Season and Land District, &c.

Land District, &c.	1924–25.	1925–26.	1926–27.	1927–28.	1928–29.
North Auckland ..	31,049	24,951	24,616	41,067	48,713
Auckland	93,912	77,651	82,338	101,796	106,823
Gisborne	4,022	3,891	2,626	5,756	9,579
Hawke's Bay ..	5,468	4,902	2,987	4,638	8,243
Taranaki	16,840	16,485	14,696	23,581	30,298
Wellington	37,415	29,653	29,517	32,267	36,547
North Island ..	188,706	157,533	156,780	209,105	240,203
Nelson	574	880	620	656	1,241
Marlborough ..	147	441	258	434	2,176
Westland	..	..	74	..	..
Canterbury	2,171	1,799	4,292	3,280	3,524
Otago	1,859	903	950	769	581
Southland	3,393	8,220	7,176	9,886	11,869
South Island ..	8,144	12,243	13,370	15,025	19,391
Dominion	196,850	169,776	170,150	224,130	259,594

Table 3 provides particulars of the number and size of the various organizations operating last season, the summary being based on all cows in milk at least 100 days. Taken as a whole, and judged in the light of the information already given, this table has no unusual features except perhaps the substantial increase in the average number of cows per organization. Even this would not be altogether unexpected when one stops to consider the retrogression of association testing and the increased number of group organizations with their larger membership. In this table the term "organization" denotes any herd-testing body, whether Group or Association. Moreover, the term "organization" also applies to each individual unit. For instance, the New Zealand Co-operative Herd-testing Association (Inc.) is not included as one unit, but as sixty-seven, which was the number of individual groups under its control last season.

Table 3.—Number of Cows, Herds, and Organizations represented in Effective Seasons' Summaries received. (Basis: All Cows in Milk 100 Days or over.)*

—	1926–27.	1927–28.	1928–29.
Number of organizations	211	242	257
Number of herds	4,678	5,927	6,663
Number of cows	155,028	206,323	245,811
Average number of herds per organization	22	24	25
Average number of cows per herd ..	33	35	36
Average number of cows per organization..	734	853	956

* Including both Group and Association systems, and on basis of sections or units.

In Table 4 the groups and associations are classified according to herds and cows, and the figures bear out our remarks relating to Table 3. There is an increase in herds per group, and a considerable increase in cows per group. The average number of cows per herd appears to be fluctuating around a point. This, however, is a matter independent of testing, and involves the question of size of farm, &c., as under group-testing rules all normal cows must be entered. The Association half of the table indicates a slight decrease under each heading. In explanation of this falling-off, however, it should be stated that frequently only cows previously untested are placed under

Table 4.—Average Size of Associations and Groups for which Effective Seasons' Summaries on the Basis of all Cows in Milk 100 Days or over were received.

System.	Season.	Average Number of Herds per Association or Group.	Average Number of Cows per Association or Group.	Average Number of Cows per Herd.
Association ..	1925–26	19	407	22
	1926–27	18	408	22
	1927–28	21	414	20
	1928–29	20	401	19
Group ..	1925–26	27	1,205	44
	1926–27	26	1,127	43
	1927–28	28	1,250	45
	1928–29	29	1,304	44

Association test, and, moreover, the Association system is now principally operated among small farmers in scattered districts where the Group method would not be practicable. Group testing is economical in cost to the farmer only in more or less intensive dairying districts.

The effective summaries received for the 1928–29 season represent 94·6 per cent. of the total number of cows tested twice or more for all groups and associations operating in the Dominion. This position is very gratifying, and we should like to place on record once more our appreciation of the courteous and valuable service which the officers in charge of the various herd-testing organizations have rendered in this connection. For purposes of this review production summaries are based on all cows in milk 100 days or more, which is the accepted standard for the compilation of ordinary herd-testing returns. There were 245,811 cows in our effective summaries for the past season, or 39,448 more than for 1927–28.

The average-yield figure, which last year was down to 224·68 lb. of butterfat, has risen for 1928–29 to a fraction more than the 1926–27 mark. The average butterfat production for the season under review works out at 240·50 lb., which, taking into account the marked increase in total cows represented, is a very satisfactory attainment. A grand summary of production results for the past season is supplied by Table 5.

Table 5.—Grand Summary of all Effective Herd-testing Results on the Basis of all Cows in Milk 100 Days or over received for the Last Two Seasons.

	1927–28.		1928–29.	
	Days in Milk.	Butterfat-production.	Days in Milk.	Butterfat-production.
		lb.		lb.
Average for all cows (206,323 in 1927–28 and 245,811 in 1928–29)	230	224·68	242	240·59
Highest Association or Group average ..	258	377·70	273	358·50
Lowest Association or Group average ..	185	116·08	140	131·76
Highest herd average	272	484·88	322	475·70
Lowest herd average	112	68·03	115	50·54
Highest cow	263	858·20	305	888·00
Lowest cow	130	7·74	105	8·00
Average daily production of butterfat for all cows	..	0·98	..	0·99

A matter which may be introduced before continuing the subject of average production—and a very interesting and important one—concerns the proportion between the total cows used for dairying purposes and the number actually in milk. Statistics relating to this subject are supplied by Table 6. It will be noticed that in five years the dairy-cow population has increased by 47,631. But there were 95,637 more cows milked in 1928–29 than in 1924–25, while, despite the increase in total cows, the number of dry cows has decreased by 46,000 in the five years. This surely represents a more satisfactory economic position, as there is a marked tendency in the direction of decreasing the proportion of non-producing cows.

Table 6.—Cows in Milk and Dry.

Season.	Total Cows.	Cows in Milk.	Dry Cows.
1924–25	1,323,432	1,195,567	127,865
1925–26	1,303,856	1,181,441	122,415
1926–27	1,303,225	1,181,545	121,680
1927–28	1,352,398	1,242,729	109,669
1928–29	1,371,063	1,291,204	79,859

Table 7 supplies a classification of production according to system of operation, the two principal systems—namely, Group and Association—being the classifications adopted. In view of the marked rise in average production for all cows from last season, it would naturally be expected that both systems would show an increase. In actual fact the Group average rose by some 13·23 lb. butterfat, while the Association average increased by 22·26 lb. Considering that there were 43,870 more Group cows tested last year than the year before, a meritorious standard has been attained.

Table 7.—Average Production of all Effective Results for Past Three Seasons classified according to System. (Basis: All Cows in Milk 100 Days or over.)

Season.	System.	Number of Associations or Groups.	Number of Herds.	Number of Cows.	Average Days in Milk.	Average Butterfat.
						lb.
1926–27 ..	Association	115	2,140	46,878	220	232·64
	Group ..	96	2,538	108,150	241	243·88
1927–28 ..	Association	115	2,389	47,589	204	212·07
	Group ..	127	3,538	158,734	237	228·46
1928–29 ..	Association	99	2,000	39,722	222	234·33
	Group ..	158	4,663	206,089	246	241·69

In keeping with the procedure followed in previous summarizing we have again taken out a production classification on the basis of all cows which have been tested for seven periods—that is, 210 days or more. This summary, however, applies only to those associations conducted by the Dairy Division's Testing Officers and the returns figured in the Division's head office. It would be very interesting and useful if similar figures could be obtained for all organizations in the Dominion, but on account of the labour involved privately-controlled organizations have not been asked to supply the necessary particulars. A summary founded on a seven-months period affords results more in conformity with the length of a dairying season, and provides more exact evidence of what our average normal cow is capable of producing. The 100-day summary, on the other hand, would include performances of a number of cows of such poor quality that they do not continue in milk for 210 days. The 100-day summary has the disadvantage, however, of including certain records which should perhaps be omitted —the records, among others, of cows which have died, fallen sick, or

been sold or culled, and thus ceased being tested at a date preceding that on which, under normal conditions, their test would have been completed.

Table 8 enables a comparison with previous years between results of yield for cows in milk 100 days and more and cows in milk 210 days and more for Association testing carried out by officers of the Dairy Division. A point which is noticeable is that the 100-day average has risen by 17·86 lb. butterfat, while the 210-day average has only gone up by 9·35 lb. The explanation largely lies in the fact that the 100-day average lactation is no less than thirteen days longer than last year, whereas the 210-day average milking-period has gone up only four days. The slow but certain increase in average lactation is not the least desirable feature of the herd-testing development. For many years the average dairy cow did not milk more than seven months. The eight-months mark has now been reached. If the dairy industry could so develop its cows as to produce economically for ten months, even then two months' rest would be left for the producers, and the annual output of dairy-produce greatly added to.

Table 8.—Average Production for Associations conducted by Officers of the Dairy Division, comparing Difference in Production between Results of Summaries compiled on the Basis of all Cows in Milk 100 Days or more and 210 Days or more.

Year.	100 Days or more.		210 Days or more.	
	Average Days.	Average Butterfat.	Average Days.	Average Butterfat.
		lb.		lb.
1924–25	223	231·51	258	266·29
1925–26	218	221·19	257	259·20
1926–27	236	247·35	262	273·36
1927–28	229	246·91	264	282·54
1928–29	242	264·77	268	291·89

In Table 9 average butterfat-production has been classified according to land districts. Compared with the preceding season there has been an increase in average yield in every land district except two. Districts which, all things considered, stand out are Nelson and Marlborough. The past season's results should be an encouragement to further effort, and present indications point to the fact that a substantial increase in herd-testing in these two districts may be expected for the 1929–30 season.

Table 10 is interesting from the point of view of illustrating the difference in distribution of records for the Group and Association systems. In the upper half of each of the two seasons' tabulations the numbers of records are given, while in the lower half these have been converted to percentages. A perusal of this table over a period of years reveals a gradual thinning-out of the lower subdivisions and a trend toward the average cow-yield. It is also apparent that increased average production is being brought about not so much by the fact that the good cows are better than in the past, but because through the elimination of the poorer producers the dairy cow is becoming, as

Table 9.—Average Production, according to Land Districts, &c., of all Cows under Herd-test for which Effective Seasons' Summaries were obtained. (Basis : 100 Days or over).

Land District, &c.	1925–26.			1926–27.			1927–28.			1928–29.		
	Cows in Summary.	Average Days in Milk.	Average Butterfat.	Cows in Summary.	Average Days in Milk.	Average Butterfat.	Cows in Summary.	Average Days in Milk.	Average Butterfat.	Cows in Summary.	Average Days in Milk.	Average Butterfat.
			lb.			lb.			lb.			lb.
North Auckland	20,925	224	210·94	21,471	224	232·46	36,395	211	191·66	45,735	234	222·87
Auckland	73,101	236	226·08	78,625	240	244·82	95,799	235	225·04	102,239	247	238·27
Gisborne	3,368	212	191·03	2,405	217	218·08	5,244	231	234·39	9,045	233	230·45
Hawke's Bay	4,294	224	189·32	2,285	230	208·95	4,107	230	233·72	7,705	243	249·61
Taranaki	12,846	235	242·42	12,857	241	239·67	22,180	238	247·01	28,515	249	259·76
Wellington	22,043	223	212·64	25,400	258	256·53	29,300	233	244·89	34,524	243	257·93
North Island ..	136,577	231	221·11	143,043	240	252·29	193,025	230	224·72	227,763	243	240·92
Nelson	609	192	207·16	261	233	239·27	341	154	162·44	936	203	237·00
Marlborough	..	..	..	..	..	..	..	..	..	1,956	217	244·84
Westland	..	..	..	..	..	..	..	..	..	..	..	..
Canterbury	391	195	217·21	3,917	207	219·03	2,847	226	222·57	3,081	218	237·67
Otago	804	218	223·60	820	199	247·02	720	239	273·42	552	219	253·99
Southland	8,017	217	211·14	6,987	217	215·36	9,390	220	222·94	11,523	225	231·89
South Island ..	9,821	214	212·15	11,985	213	219·06	13,298	221	224·04	18,048	222	235·22
Dominion	146,398	230	220·51	155,028	238	240·48	206,323	230	224·68	245,811	242	240·50

Table 10.—Distribution of Records for all Tested Cows in the Dominion represented in Effective Annual Summaries received, Seasons 1927–28 and 1928–29. (Basis : 100 Days or over.)

System.	Class Limits (in Pounds of Butterfat).																		Total Number of Cows classified.
	Under 50.	50–100.	100–150.	150–200.	200–250.	250–300.	300–350.	350–400.	400–450.	450–500.	500–550.	550–600.	600–650.	650–700.	700–750.	750–800.	800–850.	850–900.	
1927–28.							*Numbers.*												
Association	41	2,386	8,947	11,449	10,398	7,433	4,314	1,743	648	168	40	16	3	2	..	..	..	1	47,589
Group ..	552	5,620	19,194	34,598	39,525	31,326	17,956	7,062	2,163	563	127	35	7	2	3	1	..	..	158,734
Both ..	593	8,006	28,141	46,047	49,923	38,759	22,270	8,805	2,811	731	167	51	10	4	3	1	..	1	206,323
							Percentages.												
Association	0·09	5·01	18·80	24·06	21·85	15·62	9·07	3·66	1·36	0·35	0·08	0·03	0·01	*	..	..	..	*	47,589
Group ..	0·35	3·54	12·09	21·80	24·90	19·73	11·31	4·45	1·36	0·35	0·08	0·02	*	*	*	*	..	..	158,734
Both ..	0·29	3·88	13·64	22·32	24·20	18·78	10·79	4·27	1·36	0·35	0·08	0·02	*	*	*	*	..	*	206,323
1928–29.							*Numbers.*												
Association	32	1,132	4,780	8,075	9,414	7,830	4,883	2,363	843	265	79	17	6	2	1	..	..	..	39,722
Group ..	468	5,384	17,993	38,032	51,229	45,775	28,341	12,811	4,440	1,230	299	67	15	2	..	2	..	1	206,089
Both ..	500	6,516	22,773	46,107	60,643	53,605	33,224	15,174	5,283	1,495	378	84	21	4	1	2	..	1	245,811
							Percentages.												
Association	0·08	2·85	12·03	20·33	23·70	19·71	12·29	5·95	2·12	0·67	0·20	0·04	0·02	*	*	..	..	..	39,722
Group ..	0·23	2·61	8·73	18·45	24·86	22·21	13·75	6·22	2·15	0·60	0·14	0·03	0·01	*	..	*	..	*	206,089
Both ..	0·20	2·65	9·26	18·76	24·67	21·81	13·52	6·17	2·15	0·61	0·15	0·03	0·01	*	*	*	..	*	245,811

* Data occurring, but relatively insignificant.

it were, more standardized. It is realized that in actual practice culling is often difficult, and that without ready replacement it is not always desirable. What is required is the breeding of a better and more uniform animal to replace what is called the cull cow.

Table 11, which is similar to Table 10, except that it includes productions on the 210-day basis, bears out our remarks concerning the latter table. As pointed out in a previous review, it is clear that the higher yield of cows in the 210-days-or-more class is not so much accounted for by the fact that it contains more higher-yielding animals, but because there are fewer cows in the lower-production subdivisions.

Table 11.—Percentage Distribution of Records and Herd Averages in Organizations controlled by Dairy Division, Season 1928–29.

Basis.	Class Limits (in Pounds of Butterfat).														Total Number classified.
	Under 50	50–100	100–150	150–200	200–250	250–300	300–350	350–400	400–450	450–500	500–550	550–600	600–650	650–700	700–750	
							Records.									Cows.
100 days and over	0·02	1·24	7·34	13·71	22·61	22·87	16·58	9·66	3·95	1·37	0·47	0·09	0·06	..	0·02	5,259
210 days and over	0·03	0·03	0·95	7·57	22·41	27·28	21·21	12·66	5·19	1·80	0·63	0·12	0·08	..	0·03	3,988
							Herd Averages.									*Herds.*
100 days and over	..	0·34	3·79	12·07	20·34	28·62	22·76	8·62	2·76	0·69	..	..	..	..	..	290
210 days and over	..	..	..	3·56	17·39	32·01	29·25	12·65	3·95	1·18	..	..	..	..	..	253

Summing up, it may safely be said that the New Zealand dairy industry is justified in viewing the general position with satisfaction. More cows are being milked each year, the dairy-cow population is increasing (though perhaps not as rapidly as one might wish), and average production per cow is slowly but certainly on the upward trend. From the broader point of view the market values and general conditions relating to the commerce in dairy-produce presage a hopeful future, provided our quality is equal to the demands of the consumer.

GOVERNMENT SUBSIDY AND HERD-TESTING CENTRAL EXECUTIVE.

Some of the increased support accorded the herd-testing movement by the industry must be credited to the Government's assistance through grants to testing dairy-herd owners. The first subsidy was granted in July, 1927, for the 1927–28 dairying season, the amount being £8,000, subsequently increased to a maximum of £9,500, to enable a subsidy of 1s. per cow to be paid on animals eligible for subsidy on testing carried out under the Group system and 6d. per cow for the Association system. The second subsidy was increased to £10,500, and has been applied to the 1928–29 testing. A similar amount has been granted for distribution in due course on account of the current season (1929–30).

Shortly after the first grant was made a small Board was set up to advise concerning its distribution. This body, named the Herd-testing Subsidy Allocation Board, comprised five members—namely, Messrs. Dynes Fulton, Hamilton (Chairman); A. Morton,

Egmont Village (representing the National Dairy Association); W. A. Iorns, Martinborough (representing the New Zealand Dairy-produce Board); G. R. Herron, Pukerau (representing the South Island Dairy Association); and W. M. Singleton, Director of the Dairy Division. The Board operated for two seasons, during which time it rendered valuable service to the herd-testing movement.

In July, 1929, the place of the Allocation Board was taken by the New Zealand Herd-testing Central Executive, a larger and more representative body set up to advise concerning the general policy of herd-testing in the Dominion, and of herd-testing matters as a whole. This executive is comprised of Messrs. Dynes Fulton, P. W. Hill, G. H. Bell, and G. R. Herron (Dominion Group Herd-testing Federation), W. A. Iorns (Dairy-produce Board), Professor W. Riddet (Dairy Research Institute), Dr. C. J. Reakes (Director-General of Agriculture), and the Director of the Dairy Division. Mr. Dynes Fulton is Chairman of the executive; Mr. H. G. Philpott, of the Dairy Division, acts as secretary.

In addition to the grant of £10,500 to testing dairy-herd owners, the Government has made a grant to the Dominion Group Herd-testing Federation to cover the cost of a supervisor. On the recommendation of the Central Executive, Mr. C. M. Hume, who has acted as manager of the New Zealand Co-operative Herd-testing Association since its inception, has been appointed Federation Supervisor of Herd-testing. It is expected that the services of the Herd-testing Central Executive, together with those of the Federation Supervisor, will do much toward improving our herd-testing systems, curtailing costs, and standardizing practice. It is also hoped that the united and systematic endeavour now being put into operation will tend to make every herd-testing organization efficient and self-supporting, so that the State may in due time be able to withdraw its financial assistance.

PARASITIC GASTRITIS IN LAMBS.

THE Director of the Live-stock Division refers to this trouble in his annual report for 1928–29, as follows:—

A considerable mortality from parasitic gastritis occurred among lambs, more particularly in the Wellington Province, some flocks suffering rather heavily. Owing to the damp season experienced this was to be expected, and under such circumstances owners should see that their lambs are well cared for, particularly at weaning-time. At this time, if lambs are allowed to fend for themselves without suitable feed being provided, a check in their growth is unavoidable, thus weakening the resisting-power of the young animals, with the result that they become a prey to parasites. Once such a condition becomes established it is almost impossible to avoid heavy mortality, as only those with strong constitutions will be able to survive. In such cases the lambs eat but sparingly, and cannot be induced to take artificial food. At this stage medicinal treatment frequently does more harm than good, for even if the parasites are destroyed the animals have not sufficient recuperative powers to enable them to recover. In those flocks where suitable feeding-conditions are available to enable them to get over the weaning and carry them into the winter without going back in condition, the loss is infinitesimal compared with that in those flocks for which little or no provision is made. Many sheep-farmers now realize that it pays to give their lambs proper attention, and it is to be hoped that the remainder will follow their example. When this condition is general the heavy death-rate among hoggets during the winter months will be reduced considerably.

INTENSIVE GRASS-FARMING.

DAIRY-FARM EXPERIMENT AT MANAWARU, SEASON 1928 29.

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The results of recent research work indicate the possibility of greatly increasing the per-acre production of butterfat from the dairying grasslands of New Zealand by the more intensive use of fertilizers and the adoption of improved methods of grass ultilization. Briefly, the new system consists in the close subdivision of grassland, regulated stocking, and heavy and complete manuring. Grass is treated as a crop, the pasture being allowed to reach a height of 3 in. to 5 in., quickly grazed down, and then spelled till the next crop of young grass is ready.

An experiment to test the application of the new methods of grassland management to New Zealand conditions was commenced on Mr. John Ward's farm, at Manawaru, near Te Aroha, in 1927–28, and was continued during the 1928–29 season. An article by G. W. Wild, describing the first season's work, appeared in the December, 1928, issue of this *Journal*. The outstanding feature of that season was the large increase in the per-acre production of butterfat, which rose from 161 lb. in 1926–27 to 203½ lb. in 1927–28.

In the 1928–29 season Mr. Ward's farm, which is 50 acres in area, was subdivided into thirteen fields, all of which were in grass. It will be seen from the sketch-plan (Fig. 3, page 230) that all the fields radiate from a central race, which is the most convenient arrangement for the satisfactory working of a rotational grazing scheme. Water is supplied to each field.

MANURING AND MANAGEMENT OF THE FARM PASTURES.

The pastures were top-dressed with 4 cwt. per acre of superphosphate during June, 1928, and 2½ cwt. during the following August, and those not closed for hay received a further 1½ cwt. during December. All the fields were again top-dressed with super at the rate of 2 cwt. per acre in March, 1929.

Six of the fields, together comprising half the grazing-area, were treated with sulphate of ammonia at various times during the season, 80 lb. per acre being applied in July, 1928, 1 cwt. in October, 100 lb. in December, and 1 cwt. in March, 1929. It is not intended to discuss the effects of the nitrogenous dressings until another season's trial is completed. The floods which occured in July and September, 1928, almost nullified the effects of the July application of nitrogen, which has been shown elsewhere to be the most remunerative of the nitrogenous dressings.

Carbonate of lime was applied to all fields during May, 1929, at the rate of 10 cwt. per acre, with the exception of a ½-chain strip at 1 ton per acre and an equal strip without lime, to enable observation to be made of the effect of liming.

FIG. 1. VIEW ON MR. WARD'S FARM, SHOWING CENTRAL RACE, WITH 3-ACRE FIELDS ON EACH SIDE.

FIG. 2. PORTION OF THE HERD GRAZING A FIELD IN AUGUST.

A strip 2 chains in width across each field, and at right angles to the other dressings, was dressed with 30 per cent. potash salts, at the rate of 2 cwt. per acre, in March, 1929.

The system of grazing was a modification of that adopted in the previous season. Instead of being grazed for ten-day periods on the ammonia and phosphate portions of the farm in turn, the fields were grazed when they were ready, irrespective of their place in the grazing rotation. It will be found on all farms where such a system of rotational grazing is commenced that some fields, by reason either of their superior sward, natural fertility, or some other cause, recover more quickly from grazing than others, and the farmer must be guided by his own judgment rather than follow a set rotation when such conditions occur. In the experiment under review it was intended to graze down each field, when the grass had attained a height of 3 in. to 5 in., with the milking-herd, followed by the dry stock to clean up the roughage. Any tendency of the grass to go to seed was checked by the use of the mower when necessary. The pastures were then harrowed and spelled until another flush of grass was ready.

It was decided to close 6 acres for hay and 6 acres for ensilage, together with any other fields which might not be needed for grazing purposes. Unfortunately, the whole farm was under water

for three days in July through the blocking of a culvert, and another flood occurred in September, so that grass-growth received a very severe check. In these circumstances much less grass was shut up for hay and ensilage than was at first anticipated, and with

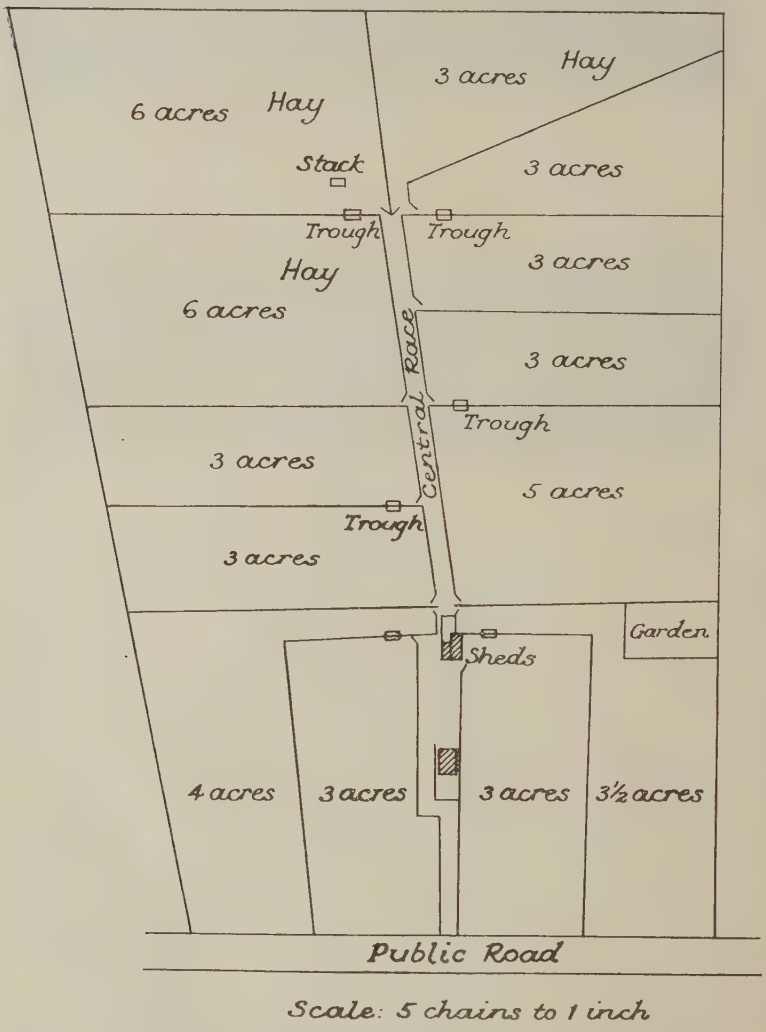

FIG. 3. SKETCH-PLAN OF MR. WARD'S FARM, SHOWING SUBDIVISIONS, POSITION OF WATER-TROUGHS, BUILDINGS, ETC.

further unfavourable conditions experienced in November and early December the growth on the fields closed for ensilage was hardly sufficient to warrant the making of a stack. All the surplus grass was therefore converted into hay.

MANAGEMENT OF THE DAIRY HERD.

Throughout the early part of the season until the aftermath of the hay-fields was available there were nine fields of about 3 acres each and one 5-acre field available for grazing. With the herd consisting of thirty-seven cows the fields were grazed at the rate of twelve cows per acre, and this was considered sufficient to get two grazing-days of twenty-four hours each. The nine head of dry stock following the milking-herd were also kept on the fields for two days, and the roughage was cleaned up fairly well by this means.

In early December the effects of the flood, followed by close grazing in September, became apparent, and, although the production for the season was only a little behind that of the previous season, the production per cow was much lower, and there was a risk of production falling away badly in the event of a drought. It was therefore decided to reduce the stocking to some extent by sending the dry stock away from the farm, and to divide the herd so that seven or eight of the poorer cows should act as followers to the main herd. This scheme was tried, but after a while was abandoned on account of the inconvenience caused during milking, and the herd was afterwards worked in one unit. The fact that the fields had a better chance to recover after grazing and that production was immediately increased justified the policy of sending away the dry stock. It was then necessary to resort to the mower to keep down excessive rank growth and seed-heads.

SUPPLEMENTARY FEED.

During February and March very dry conditions prevailed, and concentrates consisting of one part linseed-cake, one part bran, and two parts crushed oats were fed to the cows at the rate of 2 lb. per head per day from 1st February, increased to 6 lb. per day from 11th March until the end of that month.

If silage had been available it would have been fed to the stock during this period. Such periods of drought commonly occur during late summer in Auckland Province, and where a supply of silage has been conserved it will go a long way to meet the deficiencies at this time of the year. It is quite possible, however, that when intensive grass-farming becomes general some concentrate may become necessary if the sharp decline in yield during such periods of scarcity is to be stemmed, and so that the flush of grass which appears when rain does come may be consumed by cows which are still producing fairly highly.

BUTTERFAT-PRODUCTION.

From the figures of production over the last three seasons (Table 1) and the graph (Fig. 4) it will be seen that in spite of very unfavourable

conditions in the early part of the 1928–29 season a very satisfactory increase in carrying-capacity and butterfat-production was accomplished.

Table 1.—Butterfat-production on Mr. Ward's Farm.

Season.	Number of Fields.	Butterfat to the End of December.	Butterfat to the End of May.	Butterfat per Acre.	Number of Cows.	Butterfat per Cow.	Fertilizers,	
							Super-phosphate.	Sulphate of Ammonia.
		lb.	lb.	lb.		lb.	Tons.	Tons.
1926–27	8	4,111	8,043	161	27	298	7½	..
1927–28	10	5,812	10,173	203½	32	318	14	2
1928–29	13	5,385	10,624	212½	37	287	22½	4½

It will be noted that there was an increase of 2,130 lb. of butterfat in the 1927–28 season over the production of 1926–27, and production was further increased last season by 451 lb. The latter increase was obtained in spite of the fact that till the end of December production was over 400 lb. behind that of the 1927–28 season, a state of affairs which can be attributed entirely to the floods, for it will be seen from the graph that production on this farm is usually at its highest about October.

The records of rainfall at Te Aroha show that while the 1926–27 season, with a rainfall well distributed throughout the year, was a good one for dairying, the following season, with its summer drought, was largely unfavourable. A period of very dry weather also occurred during January, February, and early March of the 1928–29 season. The increased production during the two seasons in which the experiment has been carried on was therefore obtained under comparatively adverse climatic conditions. Table 2 gives the monthly rainfall for the three seasons.

Table 2.—Rainfall at Te Aroha for Seasons 1926–27 to 1928–29.

Month.	1926–27.	1927–28.	1928–29.
June	2·35	4·08	4·23
July	8·37	10·44	17·28
August	6·52	6·91	4·79
September	2·18	4·83	6·53
October	7·65	1·57	6·76
November	6·87	3·69	2·68
December	4·38	1·66	5·00
January	2·00	0·15	2·63
February	3·89	2·17	0·36
March	5·19	9·28	4·11
April	2·44	6·84	8·15
May	5·93	11·91	4·84
Total for year	57·77	63·53	67·36

The Fig. 5 graph shows the production from Ward's farm and four other farms in the same locality worked out on a 50-acre basis for ten-day periods. A graph of actual tri-monthly production generally shows high peaks on the 31st of certain months, due to

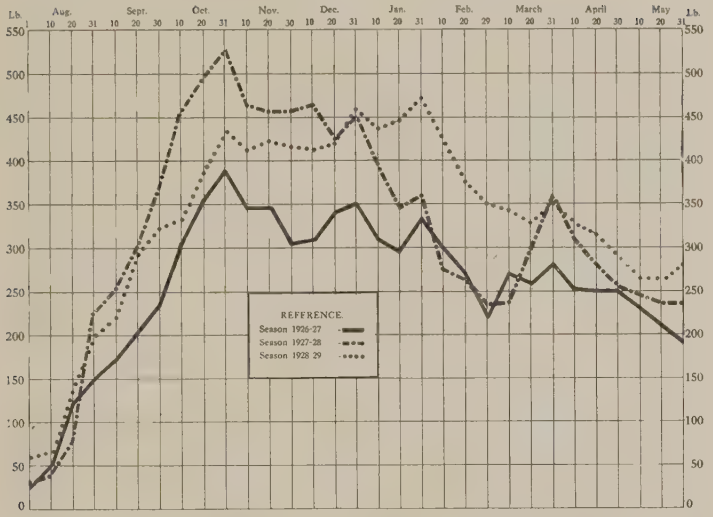

FIG. 4. GRAPH SHOWING BUTTERFAT-PRODUCTION OF MR. WARD'S FARM FOR LAST THREE SEASONS.

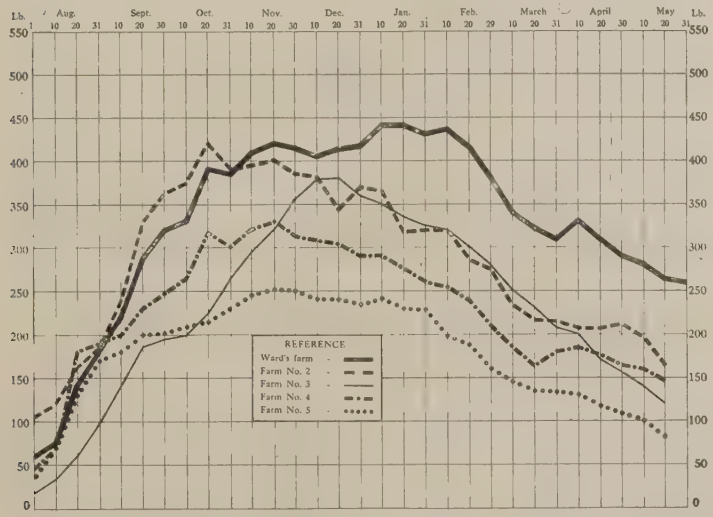

FIG. 5. GRAPH SHOWING BUTTERFAT-PRODUCTION PER 50 ACRES FOR TEN-DAY PERIODS DURING 1928–29 SEASON FOR MR. WARD'S FARM AND FOUR OTHER FARMS IN SAME LOCALITY.

the fact that there are eleven days in the last period, but in Fig. 5 the extra day has been ignored except in February, when production on 31st January and 1st March is taken into account, so that the peaks shown in Fig. 4 on 31st October, December, January, and March do not appear in the second graph.

It will be seen that on the other farms shown in the graph the highest production was obtained well before the end of December, but that on Ward's farm the peak period comes during January, and production falls gradually until late February, when the drought experienced at that time began to make itself felt on production.

There is always the tendency for peaks of production to be less acute under a system of rotational grazing, when pastures are kept under control in late spring and early summer. It is considered that a late spring application of superphosphate, such as was made on Ward's farm in December, is most valuable in stimulating clover-growth during the dry weather of February and March.

DIFFICULTIES IN ROTATIONAL GRAZING.

On a farm where all the fields are intensively rotationally grazed it is not always possible to wait until pastures reach a certain stage before feeding off unless ensilage or some other supplementary feed is available. When all the fields have been grazed in rotation fresh feed must be supplied to the stock irrespective of the amount of growth on the field next ready for grazing. Consequently it should be realized that before embarking on a system of intensive rotational grazing a good reserve of supplementary feed must be available.

Table 3 shows the various grazing-cycles during the 1928–29 season on Ward's farm, and in column 2 is given the number of days taken by the cows and dry stock to graze all the pastures on the farm. Since most of the fields are 3 acres in extent the grazing-area available for the cows during each cycle has been

Table 3.—Grazing-cycles on Rotationally grazed Pastures on Ward's Farm.

Period of Grazing.	Number of Days.	Number of Milking-cows.	Number of Dry Stock.	Number of 3-acre Fields Equivalent.	Average Time Cows allowed to graze 3-acre Field.
					Days.
(1) 1/9/28 to 17/9/28 ..	16	33	13	16	1
(2) 17/9/28 to 3/10/28 ..	16	35	10	16	1
(3) 3/10/28 to 22/10/28 ..	19	36	10	14	1½
(4) 22/10/28 to 10/11/28 ..	19	37	9	11*	1¾
(5) 10/11/28 to 1/12/28 ..	21	37	9	11*	2
(6) 1/12/28 to 24/12/28 ..	23	37	9	11*	2
(7) 24/12/28 to 14/1/29 ..	21	37	3	11*	2
(8) 14/1/29 to 1/2/29 ..	18	37	..	11*	1¾
(9) 1/2/29 to 26/2/29 ..	25	37	..	16	1½
(10) 26/2/29 to 13/3/29 ..	15	37	..	16	1
(11) 13/3/29 to 30/3/29 ..	17	36	..	16	1
(12) 30/3/29 to 21/4/29 ..	22	36	..	16	1½
(13) 21/4/29 to 4/5/29 ..	13	36	..	16	1
(14) 4/5/29 to 22/5/29 ..	18	36	..	16	1
(15) 22/5/29 to 1/6/29 ..	10	36	3	16	¾

*15 acres closed for hay.

expressed in column 5 as equivalent to a certain number of 3-acre fields. In the last column the approximate length of time taken for the herd to graze 3 acres at various times throughout the season has been worked out.

It will be seen that during late spring and early summer, when grass was at its optimum stage of growth for feeding, thirty-seven milking-cows and nine head of dry stock took two days to graze a 3-acre field. In early spring and late summer, however, conditions were so adverse that the recovery period was too prolonged to enable that optimum stage of growth to be reached, and the grass was eaten down in one to one day and a half. It would appear that 3 acres was a convenient size for this herd, since grass was consumed in two days during the flush period and in one day and a half during the greater part of the season.

During those times when the recovery period is naturally prolonged it is necessary to either shorten that period by the use of stimulating fertilizers, or to supplement the pastures by feeding out silage. It is during the early spring that one looks to nitrogenous fertilizers to give that stimulation of growth so that the recovery period may be considerably shortened. In dry periods the effects of such fertilizers in this direction have not been so pronounced, and it is to silage that one must turn to supplement the pastures, since growth of grass cannot easily be stimulated in the absence of moisture.

SUMMARIZED POINTS.

(1) The storing-up of hay and ensilage should always precede the adoption of more intensive methods of grass-farming and an increase in the numbers of the dairy herd.

(2) The size of fields on rotationally grazed farms is determined by the rate of stocking, and it would appear that this should be at the rate of twelve to fifteen cows per acre, more or less, according to the fertility of the land.

(3) A good even grass-growth 3 in. to 4 in. high will give two-grazing-days of twenty-four hours each for twelve to fifteen cows per acre.

(4) When the grass-recovery period is prolonged through adverse weather conditions the pasture should be supplemented by the feeding of ensilage.

(5) It is possible that the feeding of concentrates during periods of drought may be advantageous on intensively grazed farms.

GENERAL.

During the current season (1929-30) further experimental work will be carried out on Mr. Ward's farm, which is now subdivided into sixteen fields of 3 acres each. The work during the past two seasons has been considerably hampered by weather and flood conditions, but in spite of these setbacks much information on the technique of rotational grazing has been gained.

Mr. Ward's valuable and keen co-operation throughout the year and Mr. G. Graham's courtesy in supplying figures of milk-tests from the Manawaru Cheese-factory are acknowledged by the writer.

DISEASES OF DAIRY COWS.

OBSERVATIONS IN EUROPEAN CENTRES.

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THE object of a recent visit to the dairying countries of Europe on behalf of the New Zealand Department of Agriculture was to study and report on the control and eradication of animal-diseases. The writer, at the outset, takes the opportunity of expressing his indebtedness to the many veterinary colleagues on the Continent and in Britain whose kindness and assistance, and in many cases whose personal introductions, opened the door and paved the way for a very useful interchange of ideas on important agricultural and veterinary problems. The writer at the same time acknowledges with thanks the helpful co-operation of the High Commissioner for New Zealand in London and members of his staff in connection with the tour.

It is the aim of this series of articles on the diseases of dairy cows to record faithfully the present position regarding control in the countries visited.

I. BOVINE MASTITIS.

Mastitis (mammitis), or inflammation of the udder of the dairy cow, creates a problem of world-wide significance, since it occurs under all conditions of herd-management, in the field as well as in the cow-shed, yet it is surprising how little is known regarding the condition, or perhaps, what is of more importance, how little can be done in prevention and cure.

From the farmer's point of view the disease is important for many reasons. The milk from the quarter may be unsaleable; the cow's life may be endangered; and the produce from the whole herd may be so contaminated that its keeping-qualities are impaired, or, if made into butter and cheese, the latter will be of inferior quality. Contaminated milk will present also its public-health aspect—namely, the transmission and spread of milk-borne disease. Again, in dairying countries such as New Zealand, where the manufactured produce is mainly exported, the manufacture of such produce from milk of doubtful purity will result in lack of uniformity and consequently a lowering of the saleable standard of the national product generally. The question of mammitis-control, therefore, is intimately associated with the question of a pure milk-supply, and accordingly a problem of great economic importance both to the farmer and to the Government in all dairying countries.

Clinically, the occurrence of mastitis can best be interpreted as acute, subacute, and chronic, according to the intensity of the morbid changes in the affected udder, and to the degree of systemic disturbance manifested by the animal. The method of infection, the extent and localization of the pathological changes, and also the type of infecting organisms, may present other but less useful classifications. A combination of the latter with the clinical interpretation would appear to

meet the situation very well, and hence one speaks of an acute streptococcal mammitis. Formerly a contagious and non-contagious mammitis was described, but in the light of modern bacteriological research it must be understood that the disease in all its forms is essentially contagious, whatever the mode of entry of the invading organisms.

The entrance of the organisms causing mammitis in all its forms must be accepted as taking place in one of three ways (1) by way of the teat-canal, (2) through the udder integument, (3) centrifugally by way of the blood-stream from localizations of pre-existing disease—and it has been time and again definitely established that the most important and most common mode of entry is by way of the teat-canal. The virulence or pathogenicity of the invading organisms and the susceptibility of the animal are the two essential factors governing the onset of mammitis, the clinical manifestations, and finally the subsequent condition of the affected udder.

It is said that once a quarter has been infected the invading bacteria may never leave the gland. If this be true in all cases then it is a very important finding, which must never be lost sight of in any system of prevention or cure. Such an animal constitutes the chronic or "carrier" case, and while harbouring the organism presumably responsible for a previous acute manifestation in the herd may secrete apparently normal milk for months even, and may finally exhibit the clinical exacerbations of an acute or subacute infection. It is interesting to note that mastitis in bovines was described more than a century ago, but it was not until 1875 that the bacteriological study commenced with the published investigations of Dieckerhoff. Then followed the many researches of world-famous bacteriologists, including Franck, Nocard, Kitt, and Bang, names familiar to all workers on animal-diseases. These investigators found special organisms associated with the condition, organisms which could be cultivated in the laboratory and reproduce the disease in presumably healthy udders.

In present-day investigations the study of mastitis is essentially the study of the streptococci, for in 75 to 95 per cent. of the acute cases of mammitis, streptococci alone, as a group, have been incriminated. It will be presumed, therefore, that in this interpretation of the disease as affecting the dairy stock of New Zealand streptococcal mammitis is being discussed. As already mentioned, the contagious nature of the disease nowadays finds acceptance among stockowners, especially in outbreaks marked by definite acute manifestations, both local and systemic, whereas the subacute or chronic cases are often not so considered, and in many cases are not regarded even as mammitis.

The clean-milk enthusiast, the veterinarian in attendance, and the laboratory worker may view with grave concern the alarming incidence of chronic mammitis in a herd, yet there is no means at their disposal, and presumably may never be, of attaining and maintaining a relatively sterile secretion of milk from a previously infected quarter.

For the production of milk of undoubted cleanliness it is always recommended that the fore milk be discarded, since within the teat-canal, even under ideal conditions, there are to be found bacteria which presumably under suitable conditions can produce mammitis, and will most certainly contribute towards a high bacterial count if not so rejected. What then is likely to be the state of affairs under ordinary dairying

conditions where proper sterilization is not practised, and the hygienic measures suggested by common-sense are too often neglected? In introducing the question of clean-milk production the writer wishes to emphasize the means towards the end, for herein lies the secret of prophylaxis or prevention of spread of mastitis in the herd. Of course, many and diverse are the sources of contamination of the milk from the cow to the consumer, yet cleanliness at the source goes a long way towards furnishing a sample of reasonable bacterial count; nevertheless a flare-up of a chronic infection in one or two cows will very quickly contribute to a count of many millions of organisms per cubic centimetre.

It can be definitely stated that the bacterial flora of the teat-canal is governed by the extent to which hygienic measures are adopted by the producer, but infection located within the milk-sinuses results from a previous mastitis or an abortive specific inflammation. Experimental methods in various countries have established the fact that infection is usually, though not invariably, by way of the teat-canal, and therefore under the control of the producer and governed by the extent to which hygienic practices are adopted. We may assume that within the teat-canal the invading organisms are kept in check by the resistance manifested by the animal and exhibited by the secretion of the udder as a chemical or serological antagonism. The periodic suckling of the offspring, or the morning and evening milking by hand or machine, would assuredly assist in combating the invader, whereas endocrine inactivity, abnormal metabolism, or disease processes may turn the balance in the opposite direction.

The question as to whether the streptococci, &c., which invade the udder have increased in their pathogenicity towards the particular species or tissue is still a disputed point, and this accordingly permits of the idea that no such spontaneous increase in infective power occurs, but rather that the organisms gain the necessary footing under conditions exceptionally favourable for their growth. Just how far this can proceed is determined by the reserve resistance which the animal can concentrate or be made to concentrate at the seat of the bacterial invasion or activity. Any predisposing factor—and such have been too often laboured—which lowers the resistance of the animal, by impairing the tenacity of the mammary tissue, permits the organisms located within the teat, or even in the milk-sinuses, to invade the gland and to proliferate therein, without causing any solution of the continuity of the secreting epithelium, but nevertheless resulting in a definite and extensive catarrhal inflammation. The susceptibility of the animal is thus the all-important foundation on which to build a rational system of prophylaxis or cure.

Prophylaxis or Prevention of Mastitis.

Outbreaks in the earlier days would occur more readily and spread more rapidly, since the farmer was unable to appreciate the ill effects of uncleanliness, or the necessary sanitary measures for prevention and control. During the last quarter of a century, however, veterinarians and stockowners have become increasingly alive to the means by which the disease is spread in the herd; yet it is difficult to realize why this advance in the knowledge of prevention has been accompanied by little, if any, improvement in curative means. The farmer has looked

in vain for any laboratory finding which could be successfully used in the field for prevention or cure, yet a considerable amount of information has been amassed and much negative work done from the bacteriological standpoint.

The problem therefore, in the light of the above interpretation, presents two and only two aspects—namely, by hygienic measures to prevent bacteria from reaching the teat-canal or milk-sinuses, and, secondly, by rational methods of management and feeding to maintain or increase the resistance of the animal. With regard to the former, it is useless for the writer to give in detail the methods advocated in all dairying countries for the prevention of mammitis in a herd, but the position may be summarized by stating that the demands for pure and clean milk production are the essential requirements for the elimination and control of the disease.

The public-health aspect of the subject has engaged the attention of the writer for many years, and it has been definitely proved time and again that attention to the details for clean-milk production has resulted in a marked decrease in the incidence of mastitis in a herd. This is all the more interesting in view of the apparent failure or doubtful success of the many laboratory specifics for treatment and prophylaxis recommended in every dairying country. Such results can be and have been repreatedly obtained under commercial conditions by adopting the usual hygienic control measures in the milking-herd.

The introduction of sterilizing plants into all dairies would do infinitely more good than the gallons and gallons of vaccines, &c., now being used for mammitis. Where milking-machines are employed the whole of the essential milking parts likely to convey infection from cow to cow must be sterilized by heat, and, in the writer's experience, a cleaner and more constant bacterial count can be obtained in the composite sample by using the milking-machine under such conditions than by hand milking even.

Now, with regard to the second and perhaps equally important aspect of the subject of prevention—namely, the rational methods of management and feeding to maintain or increase the resistance of the animal—it would appear on the surface without the control of the stockowner, but it is easy to appreciate the many ways in which the animal, or at any rate the mammary gland, may succumb to infection. Experimental proof is not wanting in most dairying countries, where attempts have been made to set up the condition experimentally, but it will suffice here to consider perhaps the most important and commonest factor in lowered resistance of the mammary gland—namely, injury, from whatever cause. This may result from accidental wounds or mechanical irritation. With regard to the former, it can be appreciated from the anatomical relationship of the udder to the animal-body that the gland is at all times exposed to the risk of injury, but since such risks are too numerous and too obvious to require a detailed survey it will be more profitable to consider only mechanical irritation.

Where hand milking is practised it is found that the bad or heavy-handed milkers are always a source of trouble. This is a well-established fact and common knowledge to owners of commercial herds. With the use of the milking-machine it has been said that the dairyman's

trouble begins. This may or may not be so, but at any rate the choice of the milking-machine is important. Milking-machines of the pre-war days in Britain were notoriously unsatisfactory, but it can be truthfully stated that there are now many excellent types on the market. Special teat-cups are now in use which imitate in an admirable manner the grip and pressure of hand milking, and depend on the alternating pressure outside the teat-rubber in place of the original suction. Leaving the cups on too long, or working at too high pressure in speeding up, are now the commonest causes of injury to the teats, but in the writer's experience failure to strip or incomplete stripping is also responsible for at least induration of the udder, if not in many cases even mastitis. Unequal milking of the four quarters is a difficulty often met with, and one very liable to cause trouble sooner or later, especially in herds where the question of labour is important.

Finally, it need only be said that in prophylaxis rational management and judicious feeding, depending upon local conditions, is all that need be recommended here.

It is obvious, therefore, that the stockowner himself must understand the situation thoroughly, and be prepared to carry out the precautionary measures recommended, and to see that his workers do so also. It may not be the duty of the Government nor the work of the veterinarian to undertake preventive measures in order to reduce the incidence of mastitis in the country, but indirectly legislation aiming at a national clean-milk supply can materially assist by compelling the indifferent producer to adopt reasonable hygienic measures in his daily routine. In the Friesland district of Holland the position is interesting, for the farmers, the co-operative creameries, and the Friesian Herd Society have now been working for the past ten years, and entirely without Government intervention or aid, for the eradication of diseases of dairy cows, and by the same Hygienic Control Service to guarantee the quality of milk for consumption. Milk subject to the control has a bacterial count of not more than 50,000 organisms per cubic centimetre when examined at the creamery. The standard for the highest grade of whole milk in Britain—namely, Grade A (Certified)—is 30,000 organisms per cubic centimetre when delivered to the consumer in bottles. Previous to the initiation of the Hygienic Control Service referred to all the milk was pasteurized, but as the quality improved and tuberculosis was eradicated from the herds, pasteurization was dispensed with in many of the creameries, a procedure which is being aimed at in the whole of Friesland. It will be noticed that here the stockowner has become alive to his responsibilities, and in guaranteeing his produce has incidentally helped himself. Mastitis still occurs in Friesland, but according to the veterinarian employed by the Hygienic Control Service extensive outbreaks of this disease are now comparatively rare.

Treatment of Mastitis in Europe.

The writer wishes to record here the methods of treatment of bovine mastitis as employed in Europe, and to give in brief the opinions of the various workers on the subject, and more especially those who are attempting to treat the disease in the field.

Great Britain.—Director W. A. Pool, of the Animal Diseases Research Association, Scotland; Dr. J. Basil Buxton, of Cambridge;

Dr. Minnett, of the Research Institute in Animal Pathology; and Dr. W. H. Andrews, of the Research Laboratory, Ministry of Agriculture, Weybridge, have all been interviewed on the subject, and so also have the professors of the Veterinary Colleges in Edinburgh and London. The position would appear to be very unsatisfactory, but it will suffice to state that no success is claimed for vaccine treatment of mastitis. In Britain there are many proprietary preparations on the market, but from the writer's experience in many parts of Scotland and England no evidence of any value can be obtained, either supported by facts or properly authenticated, which might suggest any hope for this method of intervention. Autogenous vaccines are generally favoured by the veterinarians in the field, and accordingly such are still being prepared, as requested, by the research institutes and colleges. The data available in the research institutes are far from satisfactory, and the writer is therefore unable to furnish definite proof of this presumed failure of vaccination in Great Britain. Some workers favour killed bouillon cultures, whereas others prefer to use saline suspensions of surface growths. Auto-vaccination with treated or untreated milk from the infected quarter has not been met with in Britain by the writer. Intra-mammary injection of antiseptics is still being used, but here again with doubtful success.

Denmark.—Professors Olaf Bang, Folmer Nielsen, and Christiansen, all of the Copenhagen Veterinary and Agricultural High School, have had no success with either polyvalent or autogenous vaccines in the treatment of bovine mastitis. Intra-mammary injection of disinfectants in the hands of these workers gives indefinite results. Professor Folmer Nielsen, who has charge of the very large ambulatory clinic attached to the Veterinary College, uses Rivanol, an acridine derivative having a specific action on cocci, and Uberasan, a similar acryl derivative, and both German proprietary disinfectants; he also favours Lugol's iodine, in one to two parts per thousand. Since success is claimed for this method of treatment, it is always worth remembering that there is no way of estimating how far any line of treatment has influenced the course of the disease in a particular subject. Professor Nielsen does not enthusiastically proclaim success, but feels that since intervention is indicated and demanded in the acute cases of mastitis he can only resort to common-sense measures—namely, continual antiseptic injections, massage, and milking-out; the choice of the disinfectant is usually governed by the number of so-called specifics placed on the market, in the hope that the latest will justify the claims made for it by the manufacturers, whereas saline, boracic, or soda solution in high dilutions would perhaps have given equally good results.

Sweden.—Dr. H. Magnusson, of Malmo, and Professor Harry Stalfors, of the ambulatory clinic of the Veterinary High School, Stockholm, had no success to report with polyvalent or autogenous streptococcal or mixed vaccines, although, as in Britain, the latter are still used. Rational treatment—that is, massage and milking-out—are practised, although Professor Stalfors claims great success with intra-parenchymatous injections (into the udder substance) of Parenchy-matol, also of German origin, and intra-mammary (via the teat-canal) injections of Rivanol as used by Professor Nielsen of Copenhagen.

Norway.—Professor H. Holth, of the State Serum Institute, Oslo, had nothing to suggest with regard to the treatment of mastitis in bovines. Vaccines are still used in Norway, with, again, doubtful success.

Germany.—When visiting the Berlin and Hanover Veterinary High Schools the writer had an opportunity of discussing the problem of mastitis with the professors, and would particularly mention Professor Richard Goetze, of the Hanover ambulatory clinic, who is considered the authority on mastitis in Germany both from the practical and theoretical standpoint. Professor Goetze in very acute cases tries auto-vaccination, using 40 c.c. of the milk from the infected udder, either treated by heat or disinfectants, sometimes even untreated. The injection is made subcutaneously, in the hope that some good may be derived from such injections pending the preparation of the autogenous vaccine. Three or four injections of the latter are usually employed. This procedure alone in the professor's hands has not given good results, but he points out that some success may be claimed in cows affected towards the end of their lactation, provided they can be completely dried off six weeks before calving. In other cases under his care, udder antisepsis, using Rivanol, one part in four thousand, is employed, when 1,000 c.c. to 3,000 c.c. are injected into each quarter. Under vaccination and intra-mammary disinfection the udder may appear to recover, but the disease will subsequently reappear. A six-weeks rest prior to calving must be provided in order to give the udder time to throw off the infection and to regenerate the necessary protective and secreting tissues. Dr. Karsten, of the Agricultural Society, Hanover, adopts a similar line of treatment, and claims some success.

Holland.—Dr. L. De Blieck, of Utrecht, and Dr. Veenbaas, of Leeuwarden, had certainly something interesting to suggest. The former, as Professor of Bacteriology in the University Veterinary Faculty, favoured the writer with his views on the subject from the bacteriological standpoint, which need not be elaborated here. The work bearing on the practical aspect of the control of mastitis is dealt with by the Hygienic Control Service, with its own staff of veterinarians and own diagnostic laboratory under the control of Dr. Veenbaas. Living bouillon cultures of streptococci, preferably from the same strain found on the farm previously or even in the same district, are employed as a curative. Three injections are usually given—3 c.c., 5 c.c., and 8 c.c. respectively, at fourteen-day intervals. Some success is claimed for this method of intervention. Many disinfectants have been used for intra-mammary injection, but these have been entirely given up as of no real value.

Belgium.—Dr. Leynen, Director of the Government Laboratory at Brussels, informed the writer that vaccines were being prepared there for use in mastitis. He was unable to say definitely whether the employment of these was attended with any real measure of success. As in all other countries, conflicting reports were received from the field, and would again suggest a biased opinion in cases which without vaccination would most likely have given an equally favourable result.

France.—The Professors of the National Veterinary School at Alfort, and also Professor Valleé, of the Research Institute, could offer nothing in the way of treatment of mastitis. Vaccination is used extensively

in France, but again no means of estimating the true value of such intervention is available, and accordingly a definite pronouncement is impossible.

SUMMARY.

In concluding this part of the survey of the knowledge on bovine mastitis it will be of value to summarize the opinions on the question of treatment. The following will suffice, and at the same time will complete the details which were omitted from the survey regarding the position in Europe in order to save repetition :—

(1) Early diagnosis and all that this implies.

(2) Strict hygienic measures; isolation of the affected from the apparently healthy; hand milking, every hour if possible, at least during the acute stages of the disease; disinfection of premises contaminated, and of all utensils, &c., which have been in contact.

(3) Local applications and massage.

(4) Antiseptic injections into the udder.

(5) Autogenous and polyvalent vaccines.

Other methods of treatment were met with by the writer in the course of his tour—for example, feeding with infected milk, cultures, and various chemicals—but these have only been in the experimental stage. It can therefore be said that the foregoing comprises all that is known and is being tried extensively in the field in Europe. In view of the many opinions quoted by the writer (opinions of veterinarians who have devoted many years to the study of mastitis) it is surprising to find that after more than a quarter of a century there is nothing really new to report. Vaccination was tried and found wanting more than twenty years ago, and intra-mammary injections of antiseptics—dating back to 1905, when Bigoteau experimented with injections of boric-acid solutions—have not given the results anticipated.

CONSIDERATIONS ON VACCINATION.

With regard to vaccination it is difficult at first sight to appreciate why there are so many failures. Presumably vaccines are indicated when the more chronic conditions are met with, but even in such cases results are not encouraging. The invading organisms penetrate, as is generally accepted, by way of the teat-canal, and are later located in the sinuses, and thus outside the true mammary tissue, where they can multiply and produce their toxins. The body-fluids under such circumstances, although reinforced by the presence of homologous antibodies from vaccine treatment, are unable to successfully combat the invader. Attempts have been made to cause an outpouring of serum into the sinuses by administration of various chemical agents, either by intra-mammary injection or by way of the mouth, but so far such procedures in conjunction with vaccination cannot be accredited with any great success.

It is interesting in this connection to recall that in human therapy autogenous vaccines against streptococcal infections have not given the results which had been anticipated, and the position with regard to vaccination can be correctly stated by saying that any success claimed from vaccine treatment could have been obtained with the usual methods recommended in conjunction with it.

Theoretically, the use of sera from other animals hyper-immunized against several strains of the infecting organisms would appear to be justified in all acute cases when marked systemic disturbances are manifest, but at the same time the use of vaccines would be contra-indicated as likely to do more harm than good. Anti-mammitis sera are on the market, but the writer was not able to obtain information regarding their efficacy. Polyvalent anti-mammitis serum is recommended as pre-eminently indicated as a specific means of promptly overcoming the progress of an infection, rendering what might otherwise be a severe progressive udder infection destroying the function of all or part of the udder, into a comparatively mild course.

In this direction, it may be said, lies the only hope of being able to furnish a laboratory product which will be of value in the treatment of mammitis. Whether such a product will be of use in prophylaxis is a matter yet to be investigated.

(*Series to be continued.*)

VACCINE TREATMENT FOR CONTAGIOUS MAMMITIS IN DAIRY COWS.

REPORT BY THE LIVE-STOCK DIVISION.

THE following statement on the present position of vaccine treatment in mammitis is based on observation of the results obtained with various vaccines over a period of several years, and is supported by experiments carried out by officers of the Department of Agriculture, with several vaccines, including those prepared in our own Veterinary Laboratory at Wallaceville. The observations cover the use of vaccines in regard to their two main points—(1) preventive and (2) curative.

Generally speaking, the results of this inquiry are supported by those of other countries, including Australia. Eminent medical authorities are agreed that vaccines (even the so-called autogenous vaccines) prepared from organisms of the class associated with contagious mammitis do not give definite results, either of a preventive or a curative nature, in the treatment of local affections. In nearly all cases where such vaccines are used in medical practice this treatment is used as an auxiliary to surgical treatment, upon which the main factors of success are based. In mammitis the main surgical treatment necessary is complete drainage of all infective material, but this cannot be obtained as with an ordinary abscess.

Like many other new treatments for the prevention or cure of disease, vaccination was acclaimed as salvation for the much-discussed mammitis. Practice changes in medicine as in other things, and when making inquiries some difficulty was experienced in collecting reliable data and figures from the farmers themselves. In many cases the farmers admitted that they were inexperienced judges. This is only reasonable to expect, for what appear to be glowing accounts in one

case may actually be considerably influenced by other factors, such as seasonal incidence of the diesase due to climatic or feed conditions, or some other favourable or limiting influences.

INFORMATION SUPPLIED BY FARMERS.

The information here presented regarding the personal experiences of individual farmers has been obtained by departmental Veterinarians and Stock Inspectors in the different dairying districts throughout the North and the South Island. The herds concerned were of varying size, and the farm conditions were variable.

The data are based on figures supplied from 250 farms during the years 1925–26 and 1926–27. During the 1925–26 season these 250 farmers had a total of 11,806 cows inoculated with a well-known vaccine. From their own information, out of the 11,806 cows, 1,416 were affected with mammitis before any inoculation was carried out. The season following inoculation the total given for affected cows on the same farms was 1,414. Whereas on some farms an improvement was reported, on other farms the results were decidedly unfavourable. Furthermore, included in the 250 farms were fifty-four herds which were free from mammitis prior to inoculation. After inoculation thirty-two of these originally clean herds showed the presence of the disease in varying degree, though it is not suggested that they became infected by the vaccine. On the other hand, the figures show that twenty-four herds out of the 196 affected with mammitis at time of inoculation were clean the following season.

WALLACEVILLE EXPERIMENTS.

Some time ago experiments with vaccine were carried out at Wallaceville Veterinary Laboratory. Cows free from the disease were chosen. In the first case two cows were vaccinated and one left as a control. A month after vaccination the two first cows were inoculated with mammitis-infected material—one with culture, the other with milk from an acute case of the disease. The control cow was at the same time inoculated in the same way in two quarters, one with culture, the other with the same milk-supply. All three cows contracted the disease. These cows were watched for some months; before drying off the control cow cleared up, leaving one vaccinated animal still affected with the disease.

Similarly another six animals free from the disease were vaccinated, and one kept as a control. Four animals were mechanically infected along with the control. The control cow cleared up quickly, as did three of the vaccinated cows. The fourth vaccinated cow continued, until she dried off, to give organisms of contagious mammitis and inflammatory cells in her milk, although the milk itself was of normal colour. One of the three vaccinated cows, although apparently sound, flared up again into an acute attack just when drying off. The remaining two cows were kept in contact with the infected animals in order to ascertain whether they would contract the disease naturally. They remained healthy. All seven cows were milked by hand.

Eight herds, with a total number of 479 cows, were used in field experiments carried out from the Wallaceville Laboratory. The

vaccine used in each case was autogenous to the herd—that is, prepared from material obtained from the herd itself. It is claimed for such vaccines that if any immunity is conferred a herd-autogenic vaccine is superior to a stock vaccine. In these experiments a sample of milk was taken before inoculation and examined under the microscope. After inoculation from five to seven samples of milk were taken from each animal during the milking-period. As a result of these examinations no apparent improvement was shown in the vaccinated animals over the control animals. In the herds mentioned 216 animals were left as controls, the remaining 263 being vaccinated. Percentages have been worked out in each herd, but these percentages do not show anything in favour of vaccination. The herds were representative ones chosen in the Wairarapa, Taranaki, and Hamilton districts.

Apart from the foregoing, a considerable amount of experimental work has been done with vaccines prepared at Wallaceville, but none has given satisfactory results.

DECLINE IN USE OF VACCINE.

A significant fact in connection with the farm data quoted above is that although 11,806 cows were inoculated in the season 1925–26 only 1,352 of these cows were again inoculated in the following season 1926-27. The majority of these cows were animals still affected, and were inoculated free of charge to the owner.

Reports received during the 1927–28 and 1928–29 seasons indicate that the total number of inoculated animals in each district has shown a gradual reduction throughout the country, until at the present time only a comparative few are being treated. At the present time the vaccine used is sold direct to farmers, who do their own inoculations.

This Department has always advised farmers (when asked for an opinion) that it did not consider vaccines reliable either as a cure or as a preventive of mammitis, and the above-quoted figures, together with a mass of evidence of a more general nature, backed up by a thorough knowledge of immunology against organisms of the type concerned, and from controlled experiments carried out by veterinary specialists, give the Department no warrant for altering its original opinion.

OPINION OF AUSTRALIAN AUTHORITIES.

The following cablegrams, recently received by this Department in response to inquiries, give the opinion of State Veterinary authorities in Australia regarding the use of vaccines for mammitis :—

Official experience with commercial vaccine indicated not extensive in Victoria. Test on forty-seven cows, of which twenty-four affected and twenty-three non-affected before inoculation, conducted under expert observation. Subsequent to inoculation number affected reached thirty-three ; nine only remained non-affected ; meanwhile five sold. Departmental opinion on value of vaccine is adverse. No knowledge of results of use in New South Wales or Queensland.—CAMERON, Director of Agriculture, Victoria.

Your cablegram commercial mammitis vaccine. Personal opinion it is no use as prophylactic, and doubtful whether of any material curative value. Department does not favour use proprietary vaccines, and has issued regulation accordingly.—CORY, Chief Veterinary Officer, Stock Department, Queensland.

On general question of use of vaccines against contagious mammitis this Department considers they are of value chiefly from prophylactic standpoint. The

only vaccines recommended by this Department are those manufactured by Commonwealth Serum Laboratories, Royal Park, Melbourne.—HENRY, Chief Veterinary Officer, New South Wales.

GENERAL.

Information recently published by the Department of Agriculture regarding the experience with vaccines in European countries and in the United States, where similar vaccines were used for mammitis, supports authoritative opinion in this country.* In the article referred to emphasis was laid on the necessity of cleanliness, &c., in the prevention of the disease, and in the meantime this must be the farmer's sheet-anchor, combined with fomentation, massage, and stripping, as advised in the Department's Bulletin No. 141.

It is quite apparent from the numerous experiments carried out that no active immunity is conferred by vaccination. Cases have come under notice where some passive assistance may have been brought about, but this is apparently of an unstable nature and soon leaves the system. This may account for some of the apparent good results obtained, at the same time showing the very disappointing results obtained in other cases.

Dead vaccines have been proved useless for the control of contagious abortion. The vaccine used in connection with mammitis is a dead vaccine. The agglutination test is unreliable in mammitis as a guide to show antibody-formation in the blood. One must therefore depend on the clinical recurrence of the disease after inoculation, confirmed by microscopic examination of the secretion of the gland. There has been no evidence brought forward, either scientifically or in the field, under general farm conditions, to show that dead vaccines are of real value in the control of contagious streptococcic mammitis.

At present this Department is carrying on a series of "herd-autogenic" vaccinations over a number of seasons, with a view to ascertaining if any cumulative beneficial effects result from so doing.

* See also Mr. Hill Motion's observations on pages 240–242 of this issue.—ED.

Bonus for Destruction of Keas.—For the official year 1928–29 the Department of Agriculture paid a total of £748 10s. for 2,994 beaks, at 5s. per beak. From 17th July, 1929, the bonus payable by the Department has been reduced to 2s. 6d. per beak.

Farm Dairy Instruction.—The annual report of the Dairy Division for 1928–29 makes the following remarks on this subject: "Although those dairy companies which are co-operating with the Department in the employment of Farm Dairy Instructors—whose principal duties are along the line of assisting suppliers to produce and deliver to the factory a high-quality milk or cream—have improved the quality of their produce the scheme requires to be on a wider basis in order to effect the desired result throughout the whole Dominion. Combined with cream-grading, universal dairy instruction is the desideratum to be aimed at, and dairy companies are again urged to give this matter their serious consideration. The efficient manner in which the officers at present engaged in this work have carried out their duties is freely commented on, and most of the companies employing them have experienced an improvement in the grade of their products. During the year forty Farm Dairy Instructors were employed, as against thirty-one during the previous year, thirty-six being in the North and four in the South Island."

HANDLING OF EXPORT APPLES AND PEARS.

INVESTIGATION OF MATURITY, STORAGE, AND TRANSPORT CONDITIONS IN 1929 SEASON.

Horticulture Division.

DURING the fruit-export season of 1929 a wide range of practical experiments was undertaken by the Department of Agriculture, in conjunction with the Department of Scientific and Industrial Research, to gather data on various problems of cool storage and transport overseas. Early in the year, to coincide with the commencement of export, an officer of the Horticulture Division was detailed to carry out the selection and consignment of experimental cases of apples and pears for transhipment on vessels carrying fruit cargoes under refrigeration.

The twelve experimental lots of selected fruit, consisting of pears and apples were divided into two portions, half the quantity in each instance being exported, while the remaining half was retained and held in Dominion cool stores as controls on those shipped. The following matter shows that interesting facts of economic value have resulted from the storage and periodical detailed inspection of the fruit held in New Zealand.

SELECTION OF FRUIT FOR EXPERIMENTS.

This was carried out with due regard to conditions appertaining to commercial methods. The fruit to be used for experimental purposes was packed from lines passing over the grader at the time under the grades of Extra Fancy and Fancy. Good sound lines of fruit were chosen, but no special elimination of defects which may have existed was practised. By this method a fair sample of export fruit was placed under trial.

In order to further include commercial conditions all control fruit was shipped by coastal steamer to the port of loading for overseas transport, and returned for storage. This process really meant that control fruit received one more handling than fruit exported.

CONDITION OF MATURITY.

This aspect was given special consideration. Three lots of Cox's Orange Pippin were selected from the same orchard and trees, with intervals of ten days between each picking. This method was adopted in order to ascertain more specially the influence of maturity over bitter-pit, which is particularly prevalent in this variety. Worcester Pearmain was also under consideration from this aspect, two pickings being made from the same trees with an interval of eight days. The four consignments of Jonathan and Sturmer Pippin apples also gave a wide range of maturity for the varieties.

One line of P. Barry pears was kept in cool-shed storage for a period of three weeks prior to packing, in order to ascertain the influence of such storage on ripening; and one line of this variety of pear from the same orchard was packed and cool-stored straight from the trees.

IODINE TEST FOR MATURITY.

This system of ascertaining maturity by chemical conversion was applied to three lots of Jonathan apples, three lots of Cox's Orange Pippin, one lot of Worcester Pearmain, and one lot of Winter Nelis and P. Barry pears. The results obtained by this test fully justify the assertion that the iodine solution can be relied on to indicate the progress of starch conversion to sugar during the process of ripening. Unfortunately a weakness in the test asserts itself—namely, that if a natural deficiency in the starch content of individual fruits exists, the results given by the iodine solution are similar to those resulting from starch conversion. Individual apples grown in pronounced shady positions in the tree have proved to be of exceptionally low starch content.

COOL-STORAGE TEMPERATURES.

In order to ascertain the influence of temperatures on wastage, the fruit retained in New Zealand was stored at two points, thereby obtaining chambers maintained at temperatures of 32°, 34–36°, 36–38° F., and one chamber with temperatures fluctuating from 32–50°, with an average of 40°. Various positions in the chambers were selected, so that influences in this respect could be noted.

EXAMINATIONS.

The first detailed inspection made was in each instance of one-half of each case at a date to coincide with the arrival at port of destination of each ship carrying export fruit with experimental consignments, each case of fruit being divided in half equatorially. In order to determine any differences effected by some of the fruit being adjacent to the sides or ends of the cases, each apple in the cases was wrapped in a paper bearing a printed number which indicated the exact position of individual apples, so that this aspect could be checked. The examination of the remaining half of the fruit was made twenty-one days after the first examination. It was considered that twenty-one days fully represented the time fruit would be likely to be held after arrival and before consumption overseas.

During the period which elapsed between the first and second examination the fruit was kept in a room at the Department of Agriculture's offices at Wellington, with temperatures ranging from 60–70° F. This procedure was adopted to ensure storage conditions similar to those obtaining in overseas salerooms and domestic storage. A quantity of the fruit was cut at each examination, in order to determine the percentage of wastage occurring through flesh-collapse, mouldy core, bitter-pit, and other internal troubles.

NOTES ON CONDITION OF EXPERIMENTAL FRUIT.

A detailed analysis has been made on the condition of each case at the time of inspection, summarized results of which are here given. In reviewing the percentages of wastage shown as per tables attached one is confronted with what appears to be an inconsistency of results, which is not only perplexing but seems to make it impossible to come to any conclusions concerning the temperatures

most desirable for successfully maintaining fruit in good condition. However, considerable light can be thrown on the figures by explaining in some detail how these wastages apply, and it will be seen that various temperatures have had a direct bearing on the different results experienced.

Experiment No. 1: Worcester Pearmain Apples.—At first examination the small amount of wastage experienced was confined to fungal rots, a condition which was fairly uniform at all three temperatures. At the second examination fungal rots had increased in about equal proportion, with bruises, rotting, and Jonathan spot in evidence. The fruit stored at 32° showed the best condition at first examination. This condition was not maintained in subsequent storage, bruise rotting tending to equalize the wastage at final examination. The condition of the fruit stored at 34–36° and 31–50° was much superior for dessert purposes to that stored at 32°.

No. 2: Cox's Orange Apples.—At the first examination the prevalence of bitter-pit raised the percentage of wastage in fruit stored at temperatures of 31–50°; this feature did not occur at 32°. An increase at the same proportion was found at the time of the second examination. Fungal rots were also in evidence at the higher temperatures. The general condition of the fruit kept at temperatures of 34–36° was most desirable, wastage being approximately the same as that kept at 32°, while the quality for dessert purposes was superior to that kept at 32° and 31–50°.

No. 3: Worcester Pearmain Apples.—A small percentage of fungal rots represented the wastage in this experiment at the first examination. At the second examination fungal rots were pronounced in the fruit kept at 31–50°, with a smaller percentage showing in the second half of the case kept at 32° than at the first examination. Unfortunately, owing to abnormal treatment, the fruit kept at 34–36° was of no value for comparison.

No. 4: Jonathan Apples.—The wastage occurring in this experiment was so small that the results may be regarded as most successful, with economic loss negligible. It was noted that a small percentage of indeterminable rots took place in a chamber where there was excessive handling.

No. 5: Cox's Orange Apples.—At the first examination the fruit at 31–50° was in the best condition. The fruit at 34–36° had been inadvertently taken out of cool store nine days earlier than the rest of the fruit, which probably resulted in a higher percentage of fungal rot than would otherwise have taken place. The wastage in the fruit kept at 32° and 31–50° was not serious. At the second examination fungal rots were more pronounced in the fruit stored at 34–36° and 31–50° In one case of fruit stored at 32° bitter-pit, soft scald, and flesh-collapse were slightly in evidence. In almost every instance where bitter-pit occurred the individual apples were green and immature.

No. 6: Jonathan Apples.—The small amount of wastage occurring in this line of fruit was confined to rotting of punctures.

No. 7: Cox's Orange Apples.—At both examinations a small percentage of wastage in the category of fungal rots existed in fruit stored at temperatures of 34–36° and 31–50° The disastrous effect of a temperature of 32° or under is shown by the percentage of wastage

shown at each examination—namely, 44 per cent. and 46 per cent.—this wastage being practically confined to soft scald and flesh-collapse following soft scald.

Jonathan Apples.—The effect of too low a temperature was again emphasized, the high percentage of wastage at a temperature of 32° or slightly under resulting from flesh-collapse. Scald was not apparent

Table 1.—Showing Percentages of Wastage in Experimental Lots under various Storage Temperatures.

Experiment No.	First Examination.			Second Examination.		
			Worcester Pearmain.			
	32°	34–36°	31–50° (Average 40°)	32°	34–36°	31–50° (Average 40°)
1	1·65	3·8	3·3	13	13·8	14·1
3	1	2·1	5·9	4·6	..	27·9
			Cox's Orange Pippin.			
2	1	1	10	2·5	3	20
5	4·7	8	2·8	9	20	12·5
7	44	2·4	3	46	3·4	1
			Jonathan.			
4	Nil	Nil	0·56	0·51	Nil	2·04
6	1·23	Nil	Nil	1·35	2·13	0·67
7	25·6	3·5	2·1	26·9	11	2·2
8	43·5	Nil	1·6	35·8	Nil	4·3
			Sturmer.			
		36–38°			36–38°	
10	2·3	1·6	0·66	2·8	1·65	0·66
11	Nil	0·55	..	28·77	9·27	..
12	0·56	0·55	..	5·84	5·77	..
			P. Barry.			
		34–36°			34–36°	
9	..	Nil	..	..	15·7	..
9	Nil	Nil	..	16·6	27·25	..
			L'Inconnue.			
9	..	Nil	..	..	14·8	..

Table 2.—Showing number of Apples affected with various Defects under different Temperatures.

Punctures.						Fungal Rots.			Bitter-pit.			Flesh-collapse and Scald.		
Sound.			Rotted.											
32°	34–36°	31–50° (Average 40°)	32°	34–36°	31–50° (Average 40°)	32°	34–36°	31–50° (Average 40°)	32°	34–36°	31–50°	32°	34–36°	31–50°
110	103	102	19	16	31	56	86	75	22	20	24	507	23	6

Notes.—While no given temperature shows to great advantage under the heading of punctures, it is suggested that the large number of punctures not rotted may be attributed to low humidity. No given temperature shows to any advantage under the heading of bitter-pit, but striking evidence is shown of the disastrous effect of too low a temperature in connection with flesh-collapse and scald.

in this variety. Bruises had also started to break down, a condition not existing in the cases stored at 34–36° and 31-50°, where the bruises had dried out.

No. 8: Jonathan Apples.—Flesh-collapse and soft scald were responsible for the high percentage of wastage occurring in this experiment at a storage temperature of 32° and possibly slightly under. The absence of wastage at as high a temperature as 34–36° at first examination was satisfactory, especially with fruit in such fine dessert condition. From a commercial standpoint, however, such a high temperature delivers the fruit in too ripe a condition for extended storage, as indicated by the high percentage of wastage existing at second examination, such wastage being represented by fungal rots.

No. 9: P. Barry and L'Inconnue Pears.—Excellent results were obtained at all temperatures up to the time of first examination, the condition of the pears in all cases being good. The wastage at the second examination was consistent with that experienced in Experiment No. 8.

No. 10: Sturmer Pippin Apples.—This was an excellent consignment, showing no material wastage. The gradual increase in wastage towards the lowest temperature is worth noting. This fruit was kept under observation for some time after the second examination, and that stored at 32° developed flesh-collapse badly, while that stored at the higher temperatures was not affected.

No. 11: Sturmer Pippin Apples.—The high percentage of wastage observed at the second examination in fruit stored at a temperature of 32° *was entirely confined to flesh-collapse.* Fungal rots and puncture decay experienced at temperatures of 36–38° did not represent such a serious wastage as caused by flesh-collapse at lower temperature. The condition of the fruit at the higher temperature was much superior to that kept at the lower temperature.

No. 12: Sturmer Pippin Apples.—Wastage before and after twenty-one days out of cool store was equal. The quality of the apples kept at the higher temperature was superior at both examinations.

GENERAL INDICATIONS.

The detailed analysis which has been made in connection with examinations indicates—

(1) That low humidities exert a great influence in controlling fungous diseases and fungal decay, especially where punctures exist.

(2) That different varieties of fruit are best kept at different temperatures.

(3) That low humidity sufficient to create shrivel protects fruit from flesh-collapse.

(4) That bitter-pit is associated with immature fruit.

(5) That scald and flesh-collapse are associated with low temperatures.

REMARKS.

Only those defects rendering fruit unmarketable have been dealt with in this report. One exception has been made—namely, where punctures not rotted have been recorded.

The extent of the experimental work described will be appreciated when it is stated that detailed inspections were made of over 12,000 individual fruits kept under observation.

LUCERNE IN WHANGAREI DISTRICT.

SUCCESSFUL ESTABLISHMENT ON VOLCANIC LAND.

C. J. HAMBLYN, B.Agr., Instructor in Agriculture, Whangarei.

DURING the course of a discussion on the growing of lucerne, at a winter farm-school held at Whangarei in 1925, several local farmers present gave an account of failures they had experienced in trying to maintain a satisfactory stand after about two years, attributing the dying-off of the lucerne to the stiff clay subsoil and strong weed competition, the latter particularly in the winter. A request was made that the Department of Agriculture should set up a co-operative field experiment in the district, with the object of establishing, if possible, a lucerne stand on a representative area of volcanic soil in which the clay subsoil was typical of the areas on which failures had been experienced.

Accordingly an experimental plot of 1½ acres was selected on the farm of Mr. G. S. B. Morrison, at Maungatapere, some eight miles from Whangarei, the soil being a fair-quality volcanic loam, overlying a stiff and somewhat hard clay subsoil about 18 in. below the surface and several feet in depth.

After being double-disked to break up the sod, the area was ploughed out of old pasture in August, 1925. During September the land was disked and harrowed, and ground carbonate of lime applied at the rate of 1⅓ tons per acre. A crop of weeds was then allowed to grow, and the plot was finally prepared for sowing at the end of October. A few days before sowing 2 cwt. per acre of inoculated soil from an old stand was broadcast in the evening and lightly harrowed in. The area was then rolled and sown in 7 in. drills with 15 lb. of Marlborough seed per acre, the fertilizer used being 6 cwt. per acre of the following mixture: Superphosphate, 4 cwt.; blood-and-bone, 1⅓ cwt.; sulphate of potash, ⅔ cwt. The area was then harrowed again.

During the past four years careful records have been kept of the treatment and yields of the plot, an account of which is here given.

FIRST YEAR.

From the time the seed was sown, on 11th November, 1925, until the end of January, 1926, there was practically no rain of any consequence, November being a particularly dry month. The strike was consequently a poor one, though seeds continued to germinate for at least three months after sowing. The plot was cut at the end of February to prevent seeding of the annual weeds, which were very thick. The cut material was carted off, and no further cuts were possible during the first year owing to the dry weather. The plot was tine-harrowed after the first cut, and again at the beginning of winter, by which time the lucerne gave more promise.

SECOND YEAR.

The plot was top-dressed on 6th September, 1926, with 5 cwt. super and 1 cwt. sulphate of potash per acre, and on half the area twenty

loads of well-rotted cowyard manure were carted out and spread. The effect of this cowyard manure was most marked in the first and second cuts of lucerne. The whole area was then well surface-cultivated with a small spring-tooth cultivator and closed. The lucerne started into vigorous growth, tillering out and covering the ground well, and was ready to cut in the first week in December. This cut yielded over 2 tons of fairly clean hay per acre. A second cut of 2 tons was taken on 13th January, and the area cleaned up with the light cultivator. The third cut, of 1½ tons per acre, was made on 12th February, being very clean. A fourth cut, of about 1½ tons, was made on 30th March, when the area was again well cultivated. During April good growth was made by the lucerne, which was practically free from weeds, this growth being fed off by test cows and calves. On 30th May the second half of the area received cowyard manure.

FIG. 1. GENERAL VIEW OF LUCERNE DEMONSTRATION PLOT ON MR. MORRISON'S FARM, WITH TYPICAL STONY VOLCANIC LAND IN FOREGROUND.

THIRD YEAR.

On 29th August, 1927, the plot was top-dressed with 4 cwt. super and 2 cwt. sulphate of potash per acre. On 14th September it received two strokes of the spring-tooth cultivator. The first cut, on 1st December, gave 1½ tons of hay per acre. On 8th December another stroke of the cultivator was given. The second cut, made on 6th January, gave a poor crop of 1 ton per acre, on account of the very dry season. As weeds were getting bad the plot was cultivated again on 24th January, after which little growth was made until good rains fell in the middle of March—the first good fall since December. A fair cut of 1½ tons was secured on 14th April, after which the plot was again cultivated, and grazed with twenty-two calves for a week in May. On 23rd May oats were sown after surface-cultivation with the spring-tooth cultivator, with a view to providing an effective smother for winter weeds, but small birds prevented a crop being secured.

FOURTH YEAR.

During August, 1928, and again on 14th September, the spring-tooth cultivator was used effectively to clean up the plot. The first cut was made on 24th November, giving 2 tons of fairly clean hay per acre. On 1st December the plot received 4 cwt. of super per acre, together with 1 cwt. of sulphate of ammonia. A second cut was made on 14th January, giving 2½ tons of hay per acre (the best recorded for the plot). After each cut the plot was cultivated once.

FIG. 2. TAKING A CUT ON THE THREE-YEAR-OLD STAND.

FIG. 3. A FACE OF THE SECOND CUT IN FOURTH YEAR—JANUARY, 1929.

No improvement in growth or yield was shown for the sulphate of ammonia, as against check strips not sown with this fertilizer. The plot was again ready to cut by the middle of February, but was used from then on to the end of the season to provide green feed for seven test cows. Mr. Morrison considers lucerne ideal for this purpose; it is his opinion that he secured as green feed the equivalent of two further good cuts in the autumn.

CONCLUSION.

In August last, the stand was coming to its fifth season strong and healthy, and, beyond the initial disadvantage of a rather thin and patchy strike, compares favourably with stands in other parts of Auckland Province. Though one may safely say that lucerne can be grown under the soil and other conditions outlined at the beginning of this article, the details give an indication of the care and management required to get an average of from three to four cuts per annum. They will no doubt assist other farmers in deciding whether they are in a position to make use of the many undoubted advantages of lucerne as a crop.

Of the more troublesome weeds of lucerne in the stand Poa pratensis and paspalum appear to be the worst, the latter having to be continually grubbed out to keep it in check.

Thanks are due to Mr. Morrison and his sons for their able assistance and hearty co-operation with the Department in carrying out the trial.

CHEMICAL ERADICATION OF RAGWORT.

R. E. R. GRIMMETT, Chemistry Section, Department of Agriculture, Wellington.

AN experiment on the control of ragwort, recently carried out by Mrs. Taylor and Mr. E. H. Brain, of Kaharoa, Rotorua, in collaboration with the Chief Chemist and assistant officers of the Chemistry Section, has met with a sufficient measure of success to warrant the publication of tentative conclusions.

The method, which was tried on a small scale last summer and has been adopted more extensively this spring, consists in preparing a mixture of equal parts of finely crystallized sulphate of iron and agricultural salt, about an ounce of which is placed in the dry state on the crown of each plant. It is probably more effective in the spring when the plants are young and tender, and when each shower dissolves some of the mixture, washing it repeatedly into the crown and roots.

Some dozens of plants which had been thus killed were recently seen by the writer at intervals of time varying from a few days up to some months after being treated. In all cases the plants appeared completely dead and many were easily lifted out, the roots being rotten. No regrowth from the same roots was noticed. In most cases a ring of grass, varying from a few inches to a foot in diameter, has also been killed, but this was quickly replaced by tillering from adjacent grass-roots.

Although this particular farm had only a light infestation, it is safe to say that by the method adopted the ragwort has not only been held in check but has been noticeably reduced. The original formula suggested by Mr. B. C. Aston was one part sulphate of iron to three parts of common salt, but the experiments reported above suggest that a greater proportion of sulphate of iron is advisable. Further experiments are now being designed and supervised by the writer to ascertain the cost of treating extensive and heavily infested areas, and whether the proportion and methods may be improved upon.

PREVENTION OF HYDATID DISEASE IN MAN AND ANIMALS.

Live-stock Division.

HYDATID disease in man and animals can be controlled in New Zealand if reasonable care is taken by all owners of dogs and a general attempt is made by farmers. Although the disease is present in our domestic animals, especially sheep, cattle, and pigs, seldom do deaths result from its presence. On this account farmers often treat the matter lightly. In the human subject, on the other hand, hydatid disease is, owing to its nature, often a most grave problem, requiring prolonged attention in hospitals and often serious operations. The results of operation depend on the situations of the lesions, and as a certain proportion of the lesions are recurrent a percentage of cases prove fatal.

In any country where sheep, cattle, and dogs are numerous, and where the dogs come in contact with human beings, the risk of hydatid disease in the latter is greatly increased. In different countries the disease is of varying importance, and it is a reflection to some extent on the management of dogs and the hygienic habits of the people. The farmer's dog and other country dogs, on account of their close association with stock, are more susceptible to parasitic infestation with the tapeworm, which is the cause of the disease in man and animals.

Hydatids is the term applied to the formation in the body of a thin-walled sac containing watery fluid. Once infection has gained entrance to the human or animal body these cysts may form in any organ, the most common sites being the liver and lungs. Such cysts have been found in the muscular wall of the heart in cattle and in many other situations. The cyst is the intermediate stage in the development of a tapeworm of the dog, and man and animals are therefore the intermediate hosts in the life-history and development of this tapeworm. Man and animals become infected from the eggs of the tapeworm which are voided in the droppings of the dog. Therefore if infested dogs contaminate vegetables or drinking-water, or in any other way—through the dust of their coats, through fondling by children, and through their close association with man in general—expose the human subject to infection, the necessity of taking precautions to prevent such infection is at once apparent. The infested dog is the sole distributor of hydatid disease in man and animals, and it is quite apparent that cattle and sheep, through the pasture which is subject to contamination by dogs, are susceptible to infection. Pigs are also liable to be infected if allowed to range over contaminated pastures, or in the vicinity of dog-kennels.

The parasite responsible for the spread of hydatids is a small flat worm, a tapeworm known as *Taenia echinococcus*. It lives in the intestine of the dog, is about $\frac{1}{4}$ in. in size, and large numbers of eggs are passed in the dog's excrement. These eggs are so small as to be invisible to the naked eye, and when dried are liable to be carried on the coats of dogs and in many other ways, contaminating pastures

and conveying infection to the human subject. It will therefore be easily seen why so many more cases occur with country people than with town dwellers. Country dogs are more liable to become infested than city dogs and hence spread the infection to man and animals.

Dogs can only be infested with the tapeworm by eating the raw offal of animals which contains the hydatid cyst. On sheep-farms and in the vicinity of abattoirs and meat-works if dogs are allowed

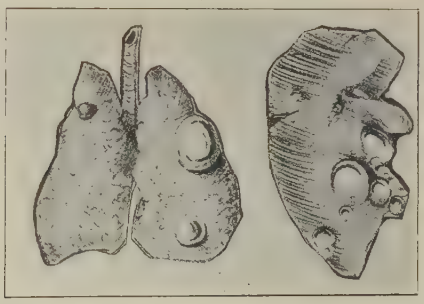

FIG. 1. SHOWING HYDATID CYSTS IN LUNGS OF SHEEP.

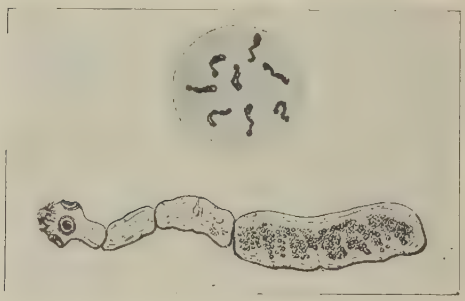

FIG. 2. HYDATID TAPEWORMS AS DEVELOPED IN DOG.

Above—actual size; below—tapeworm enlarged, showing eggs in terminal segment on right.

[Drawings by courtesy of Sir Louis E. Barnett.

access to affected lungs or livers, &c., the cysts with the immature tapeworm heads are swallowed, and as a result the dog later becomes infested with numerous adult tapeworms. Here, then, is the completion of the life-cycle of the tapeworm parasite. The tapeworm in the small intestine of the dog attaches itself by means of suckers and hooklets to the wall of the bowel and when it becomes adult numerous eggs are passed in the excrement. These eggs are the source of infection for man and animals.

PREVENTIVE MEASURES.

Seeing that the dog is the agent in disseminating hydatid disease, everything practicable should be done to lessen its opportunity for harm in this way.

(1) Never let dogs feed on raw offal. If this rule were strictly observed on farms, sheep-stations, in the vicinity of country slaughter-houses, abattoirs, and freezing-works, the dogs could not become infested. If such offal is required for feeding dogs it can be rendered harmless by boiling before use.

(2) Make an effort to kill and eradicate the hydatid tapeworms which have already obtained lodgment in the intestines of dogs that have eaten infected offal. To eradicate the tapeworms it is first necessary to fast the dog for twenty-four hours. Tapeworms are more difficult to deal with than round worms, but the following agents are recommended as effective in their results:—

(*a*) Arecoline hydrobromide in a dose of $\frac{1}{8}$ to $\frac{1}{2}$ grain, depending on the size of the dog—a terrier $\frac{1}{8}$ grain, a big sheep dog $\frac{1}{2}$ grain. The pellet or powder is dissolved in about a dessertspoonful of water and given by the mouth. This drug only expels and does not kill tapeworms, therefore care must be taken to see that the fæces expelled are rendered harmless.

(*b*) Liquid extract of male fern in doses of $\frac{1}{4}$ to 1 fluid dram, depending on the size of the dog. The dog should be prepared by giving a dose of castor-oil, and the day following the action of the drug the animal should be again purged in order to expel all the dead tapeworms.

(*c*) Freshly ground areca nut is often used in doses of 2 grains per pound body-weight of the dog to be treated. Areca nut contains arecoline as the active principle, and is not quite so reliable as the pure drug. It is important to have the areca nut freshly ground. Arecoline is usually 100 per cent. efficient, but areca nut is less efficient. When this powder is given it is sometimes incorporated in butter, and the dog swallows it without the necessity of much dosing.

One treatment with arecoline should be sufficient, but dosing two weeks later is recommended to expel any further tapeworms which had entered about the time of dosing and had not been acted upon. In the case of male fern and areca nut it is advisable to dose every six months. After a dog is dosed with the vermifuge medicine it should be chained up for two days and its fæces incinerated in a fire preferably lit on the contaminated area.

(3) Beware of swallowing the eggs of the hydatid tapeworm. In this connection the fondling of dogs by human beings is not without risk, as the dog's coat is liable to contain numerous eggs of the parasite. Infection from hand to mouth is obviously easy, and in children dirty hands may thus convey hydatid disease. The habit dogs have of licking their human companions' hands, faces, or food utensils is of course objectionable and should be checked. It is possible for human beings to become infected by eating uncooked vegetables such as watercress, lettuce, celery, and so on grown in a place open to canine

contamination. Needless to say, such articles of diet should be scrupulously washed in filtered or boiled water. Flies may act as carriers, and food should always be protected.

Lastly, it is to be remembered that a united effort on the part of dog-owners to reduce the incidence of hydatid disease in man will also considerably reduce it in animals, with, in consequence, less risk of the treated dog becoming reinfested. If the precautions here indicated are persevered with over a number of years this disease could be materially reduced if not entirely eliminated.

INSECTS INFESTING OPOSSUM-SKINS IN NEW ZEALAND.

A. F. CLARK, Forest Entomologist, State Forest Service.

THE trade in opossum-skins has now reached a point when the export value of the pelts annually shipped from New Zealand is in the vicinity of £100,000. The animals are popularly known as "opossums," though in reality they belong to the family Phalangeridæ, three species of which are recorded by Cockayne* as having been liberated in the Dominion. The animals have become acclimatized and spread through many of the forest areas in both the North and South Islands. Trapping takes place during the winter months, and the great majority of the skins are graded, sold, and shipped from two centres—Wellington and Dunedin.

The attention of the writer was directed to insect damage occurring in the skins at Dunedin. In the fur industry all such insect damage is ascribed to the "weevil," and skins showing signs of such damage are said to be in a "weevilly" condition. From a superficial examination of the skins it was at once apparent that the term "weevil" was a comprehensive one and the damage not the work of one insect, but in many cases several insects were or had been present.

From skins in a so-called weevilly condition the following insects have been bred out: *Monopis ethelella* (Newm.), *Trichophaga tapetiella* (L.), *Dermestes vulpinus* (Fabr.), *Dermestes lardarius* (L.), *Ptinus fur* (L), *Anthrenus musaeorum* (L).

Monopis ethelella is a fairly common species of moth occurring throughout New Zealand as well as in Australia. According to Myers† (1922) it has been bred from the wool of dead sheep, and is found from sea-level to an altitude of 4,000 ft.

Trichophaga tapetiella is one of the introduced clothes-moths, three species of which are found in New Zealand, and is recorded fairly frequently in dwellings and storehouses.

The remaining insects are all beetles, and are cosmopolitan in their distribution, attacking a wide range of stored products in many parts of the world. So far as can be judged the main damage is caused

* L. COCKAYNE: Monograph on the New Zealand Beech Forests, Part II.

† J. G. MYERS: Notes on the Life History of *Monopis ethelella* (Newm.). *N.Z. Journal of Science and Technology*, Vol. V, No. 4, pp. 208–9.

by the *Dermestes* beetles, which eat out holes in the hides, *Dermestes vulpinus* being the commoner of the two.

The eggs of *Dermestes vulpinus*, which are white, shining, and tapering, are laid in a crevice or a similarly sheltered spot. Upon hatching they produce a white active larva, which changes to a darker brownish colour in a few hours. Feeding in the larval stage is rapid and growth correspondingly so, until when fully grown the larva (Fig. 1) is a stout brownish-black grub measuring some 12–14 mm. (about ½ in.) in length, having the posterior abdominal segments tapering to a blunt point with a pair of spike-like projections. The dorsal surface has a lighter longitudinal stripe and is covered with a complex clothing of hairs of varying lengths. In the fully fed state the larva occasionally burrows into solid material, such as wood,* before pupation, but usually transformation to the soft white pupa takes place in a convenient crack or hiding-place. The time occupied in completing the preadult development varies very considerably with atmospheric conditions, but under favourable conditions the adult form is reached in six to eight weeks.

FIG. 1. LARVA OF DERMESTES VULPINUS.

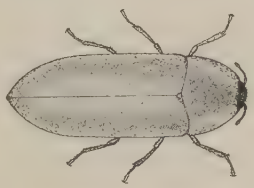

FIG. 2. ADULT. BOTH ENLARGED.
[*A. F. C. del.*

The beetle (Fig. 2) is from 10–12 mm. (rather over ½ in.) long, greyish-black in colour, with a fine yellowish pubescence most noticeable upon the dorsal surface of the head and sides of the prothorax and elytra. The ventral surface is closely covered with silvery white hairs, and has a series of darker lateral spots due to the absence of this pubescence. The inner edges of the elytra bear a small spine. The adult beetle flies but weakly, and the infestation of the insect is spread by this means and by the wandering of the larva in the early and late stages of development.

The actual aggregate damage caused by the insects was not, according to Mr. H. Roche, of the State Forest Service, apparently large during the 1928 season. The moths can be well controlled with paradichlorobenzine or flake naphthalene, both of which substances are more effective if the material to be treated is confined in a closed space. Fumigation with carbon bisulphide will control all the insects without damage to the pelts.

Pelts which are not infested and which have to be kept for some time can be adequately protected by placing them in cool storage at a temperature of 40° F. The keeping of storage-houses free as far as possible from debris and litter is an essential.

* D. MILLER: Forest and Timber Insects in New Zealand, State Forest Service Bulletin No. 2, p. 55.

GRAPE-VINES FOR NEW ZEALAND CONDITIONS.

FURTHER TEST IMPORTATIONS FROM EUROPE.

J. C. WOODFIN, Vine and Wine Instructor, Horticulture Division, Wellington.

IN continuation of the policy of introducing and testing varieties of vines with regard to their suitability for culture in New Zealand, a further number of European varieties, as scheduled below, have been recently imported by the Horticulture Division. A list of previous importations was given in the February, 1928, issue of the *Journal*.

In the following lists the most precocious varieties are indicated by the letter "P," and ripen ten to fifteen days before the Golden Chasselas, which ripens at the end of February or beginning of March in the Auckland, Hawke's Bay, and Nelson Districts; the varieties marked "1" ripen at the same time as the Golden Chasselas; "2" indicates ripening on 15th March; "3" on 25th March; and "4" on 10th April or later. The varieties ripening in the third and fourth periods, judging from their known habits in Europe, will ripen only under favourable outdoor conditions in the warmer parts of New Zealand or under glass. The exact time of ripening naturally varies with the more or less favourable climatic and local conditions.

Varieties from France.

(Nomenclature in accordance with catalogue of Messrs E. Salomon et Fils, Vine-nurserymen, Thomery, France.)

Variety.	Colour.	Ripening Period.	Remarks.
Alicante Bouschet ..	Black	2	Wine. Vigorous grower, exceptionally fruitful; special pruning necessary. Extensively grown in California for home-made wine. Wine very dark in colour.
Bicane	White	2	Table. Magnificent bunches, with large berries. Subject to irregular setting on own roots; can be improved by grafting. Very productive.
Blanc de Calabre ..	White	3	Table. Ornamental; fruitful; good quality; slight Muscat flavour.
Boudales	Black	2	Table. Greatly appreciated as a market grape in southern France.
Buckland's Sweetwater ..	White	2	Table. Handsome bunches; berries have a pleasant Sweetwater flavour. Thrives both outdoor and under glass.
Chasselas Vibert ..	White	1	Table. A very good Chasselas, ripening ten days before Golden Chasselas.
Dattier de Beyrouth ..	White	3	Table. Superb variety de luxe; large berries and very large bunches; flesh firm; flavour agreeable. Under glass.
Fernand Rose	Rose	P–1	Table and wine. Heavy producer. Resistant to disease.
Firnriesling Blanc ..	White	P–1	Wine. Very fine bouquet and sherry flavour. Resistant to disease.
Foster's Seedling ..	White	2	Table and wine. One of the best to grow, both under glass and outdoor. Must grades 11–12 Baumé.
Lang's Frühtraube ..	Black	P–1	Table and wine. Recommended for the cooler districts.

VARIETIES FROM FRANCE—*continued.*

Variety.	Colour.	Ripening Period.	Remarks.
Madeleine Noire ..	Black	P	Table. Very early.
Malakoff Isjum ..	Black	3	Table. Decorative, sweet, and agreeable flavour. Carries well. Resistant to disease. Requires long pruning.
Maraville de Malaga ..	Red ..	3	Table. Magnificent bunches of red grapes; very fine effect. Flesh firm; agreeable flavour.
Margilien	Black	1	Wine. Very fruitful. Fairly resistant to disease. Good ordinary wine.
Melascone Nera ..	Black	1–2	Wine. A Pinot recommended for its fertility and superior quality of wine.
Meslier Rose	Rose	1	Wine. A high-class white wine. Profits by generous pruning.
Muscat Caillaba ..	Black	1–2	Table and wine. Fruitful; medium-sized berry. Slight Muscat flavour.
Muscat de Frontignan ..	White	2	Table and wine. Fruitful. Celebrated Muscat wines of Frontignan in south of France, and of Asti in north Italy made from this variety. Strong Muscat flavour.
Muscat Rouge de Madère	Red ..	1–2	Table and wine. Vigorous and fruitful. Excellent Muscat flavour. Exquisite Muscat wines of Roquevaire produced from this grape.
Pinot Blanc de Chardonnay	White	1–2	Wine. The well-known Chablis. Very fruitful when allowed plenty of wood.
Plant Durif	Black	1	Wine. Very fruitful; good ordinary wine. Vine resists downy mildew.
Rosaki	White	3	Table. Vigorous and fairly fertile. Large loose bunch of very big berries, golden when ripe.
Sicilien	White	1	Table. Vigorous and fertile. Large bunches and berries. Fairly resistant. An interesting variety; recommended for local marketing.
Superbe de Candole ..	Rose	2	Table. Vigorous; very fruitful; large loose bunches, with very large berries. Prefers mica-chist and light soils.
Traminer Rose.. ..	Rose	1	Table and wine. Exquisite eating; high in sugar content. In great demand as a wine grape in Alsace.
Vigne de Michel ..	White	3	Table. Very vigorous and fertile. Very large bunches and berries. Keeps well.

Hybrid Direct Producers.

Baco 12–12	White	1–2	Table and wine.
Baco 22A	White	2–3	Table and wine.
Bertille Seyve 450 ..	White	1	Wine.
Bertille Seyve 822 ..	Black	2	Wine.
Conderc 299–35 ..	White	1	Table and wine.
Malègue 2049–3 ..	Black	1	Table and wine.
Malègue Messidor 1995-4	White	1–2	Table and wine.
Siebel 2653	White	1	Table and wine.
Siebel 4121	Black	1–2	Wine.
Siebel 4615	White	P	Table and wine.
Siebel 4633	White	2	Wine.
Siebel 4657	White	2	Table and wine.
Siebel 4762	White	1	Wine.
Siebel 4995	White	1	Table and wine
Siebel 5163	Black	1	Wine.
Siebel 5213	White	1	Wine.

VARIETIES FROM FRANCE—*continued.*

Variety.	Colour.	Ripening Period.	Remarks.
Siebel 5386	White	1	Wine.
Siebel 5408	White	1–2	Wine.
Siebel 5437	White	1	Table and wine.
Siebel 5586	Black	1	Wine.
Siebel 5813	Black	2–3	Wine.
Siebel 5860	White	1–2	Table.
Siebel 5912	Black	1–2	Wine.
Siebel 6468	White	1–2	Table and Wine.
Siebel 6905	Black	1	Wine.
Siebel 6906	Black	1	Wine.
Baco 7–3	White	1	Table.

NOTE.—In view of the conflicting opinions published in Europe on the habits and qualities of direct producers, it is deemed advisable to reserve a more complete description of the above until they have been tried out locally.

Collection of Varieties presented by the Italian Government.

Variety.	Colour.	Ripening Period.	Remarks.
Aleatico	Black	1–2	Table and wine. Sweet, refined Muscat flavour. Aromatic wine of special type.
Balafant	White	2–3	Table. Large bunches of oval grapes; Muscat flavour.
Zibbibbo d'Arquata del Tronto	White	1–2	Table. Large oval berries. An early Muscat.
Luliatica Nera ..	Black	2	Table. Medium bunches of sweet, medium, oval berries.
Luliatica Pavese ..	White	P	Table. Large bunches of big, firm, sweet, berries. Very fruitful with generous long pruning. Suitable for pergolas. Extensively grown in north Italy.
Malvasia Fuhrman ..	White	1	Table and wine. Aromatic flavour. Rich wine.
Moscato Bianco Precocissimo	White	P	Table. Earliest white Muscat. Large perfumed berries.
Moscato Bianco ..	White	2	Table and wine. Also known as "Moscato Bianco Commune." Is grown extensively for winemaking in north Italy and southern France. Known in France as Muscat of Frontignan (see above). One of best Muscats for table and wine.
Moscato di Terracina ..	White	2–3	Table. Very fine bunches of big grapes; fine flavour. Grown very extensively for the Roman markets, where it is preferred to all other varieties. Suitable for the warmer parts of New Zealand. 420A is recommended as a stock in phylloxera areas. Worth trying under glass.
Moscato Nero	Black	1–2	Table and wine. Excellent for both purposes. Medium bunches of medium berries. Gives best results with long pruning. Much used for wines, both still and sparkling.
Regina	White	2–3	Table. Professor Prosperi, one of Italy's leading viticulturists, describes this grape as probably the best table variety, as it unites all the desirable qualities of a good table grape.

COLLECTION PRESENTED BY THE ITALIAN GOVERNMENT—*continued.*

Variety.	Colour.	Ripening Period.	Remarks.
Sciamblese	White	3	Table. Heavy producer of very large open bunches of big berries. Skin rather thin. Short pruning.
Schiradzouli	White	3	Table. Large bunches and oblong grapes; handsome, and good eating; keeps well.
Greco	White	2	Table and wine. Vigorous and fruitful; large bunches and berries; excellent flavour.
Barbera	Black	2–3	Wine. Vigorous heavy bearer. Does well on most soils; prefers clay slopes facing the sun. Richly coloured wine. Must, 12–14 Baumé. Produces famous Asti and Mouferrat wines.
Fresia	Black	2	Wine. Fruitful, resistant. Must dark red, 10–11 Baumé. Wine somewhat like Burgundy. Makes good blend with Barbera.
Sangiovese	Black	2–3	Wine. Fruitful. Rich must. Excellent wine of good keeping-qualities. Forms base of Chianti wines.
Grignolino	Black	2	Wine of a very fair quality; matures early. Makes a good blend with Barbera, of which it hastens maturity. Vine prefers dry climate, sunny aspect, and poor soils.
Nebbiolo	Black	2	Wine. Aristocrat of Italian wine varieties; produces finest table wines of Italy, known as Nebbiolo, Barolo, Gattinara, Sassella, &c., according to districts produced in. Must, 13–14 Baumé. Suitable for dry calcareous hillsides of Hawke's Bay, and other similar sites in drier regions of New Zealand.
Bonarda	Black	2	Wine. Vigorous vine, fairly fruitful. Average must, 12 Baumé. Produces a fine sweet or dry wine according to treatment. Blends well with either the Barbera, Fresia, or Grignolino.
Corniola di Milazzo ..	White	2	Table. Fine bunches of long oval berries. Keeps and carries well. Vine fairly resistant to fungi.
Dorona di Venezia ..	White	1–2	Table. Vine robust and productive. A Venetian commercial variety. Long bunches of round fairly big berries. Sweetwater type.
Garganega	White	2–3	Table and wine. Long bunches of medium berries. Flesh sweet, perfumed, and slightly acid.
Moscato d'Amburgo ..	Black	2	Table and wine. The well-known Muscat Hambro. Exquisite flavour. Poor setter on own roots; sets well on 34E and some other stocks. Blended with Aleatico makes a high-class Muscat wine.
		Resistant Stock.	
Berlandieri × Riparia 34 Ecole ..	..	..	One of best stocks on which to graft table varieties. Use spreading also in wine vineyards, both in France and Italy. Like 420A, it does well on clay soils.

Varieties received in exchange from Department of Agriculture, Victoria.

Variety.	Colour.	Ripening Period.	Remarks.
Ferdinand de Lesséps ..	White	2	Table. Franco-American hybrid. Small bunches and berries, but delicious flavour and aroma.
Cabernet Sanzey ..	Black	2	Wine. A heavy-bearing Cabernet.
Palomino	White	2	Wine. One of the sherry grapes; a Sweetwater type.
		Resistant Stocks.	
Rupestris × Cordifolia 107–11	..	..	Two very promising stocks.
Cordifolia × Riparia 125–1	..	..	

NOXIOUS WEEDS CONTROL.

In his annual report for 1928–29 the Director-General of Agriculture (Dr. C. J. Reakes) makes the following remarks on the subject of noxious weeds control:—

"The officers responsible for the carrying-out of noxious-weeds inspection have had a hard time, especially in those districts where ragwort is prevalent. They do their best, and the aggregate result of their efforts doubtless represents the exercise of a considerable amount of control. But, with ragwort and blackberry especially, a full enforcement of the Act would in many cases mean asking settlers to undertake a volume of work entirely beyond the capacity of their financial resources.

"From time to time the question is raised of forming local Noxious Weeds Boards to take over the administration of the Act. This suggestion possesses a good deal of merit, in that, if adopted, local knowledge and local effort would be applied to local conditions. If given effect to it would undoubtedly mean that the Government would have to pay a considerable subsidy, though as an offset its own expenditure upon inspection would largely disappear and be limited to some overseeing responsibilities. At the present time County Councils possess powers enabling them to deal with noxious weeds (and in a few cases, by arrangement with the Department, they are co-operating in noxious weeds control). Hence a County Council could undertake the duties which the advocates of Noxious Weeds Boards consider should be carried out by the Boards.

"The control of noxious weeds constitutes a difficult and sometimes unpleasant responsibility, and consequently the undertaking of it can hardly be expected at first sight to appeal favourably to established county authorities, notwithstanding the fact that, having regard to the value of local effort in this direction, it would be a valuable forward step. Failing the establishment of localized control, some system of co-operation between the Department and County Councils, or, alternatively, local Noxious Weeds Boards, would be of distinct advantage, if not involving too great expenditure.

"All this may appear to convey the idea that the Department is desirous of getting others to relieve it of an arduous and difficult responsibility, but I trust it will be realized that the expression of these views is actuated only by the genuine desire to endeavour to find the most effective and practicable method of dealing with noxious weeds to the best advantage. As the success of Rabbit Boards has shown, organized local effort is very valuable in work of this kind."

Cider-making.—The total quantity of cider manufactured in New Zealand last season was approximately 50,000 gallons, representing a value of £12,500. The making of good-quality cider is a profitable means of utilizing large quantities of otherwise unsaleable fruit.

SEASONAL NOTES.

THE FARM.

PASTURES IN NOVEMBER.

On many farms the pastures in November are characterized by a conspicuous accumulation of surplus growth. In many instances, unless ensilage is produced, it is difficult, if not impossible, to avoid that rank growth which is a natural consequence of the surplus unused feed. The rank growth is both wasteful and harmful—wasteful because its occurrence means that the pasture-growth is passing to a less desirable, less valuable condition; harmful because the rank growth tends to open up the pastures on account of the shading, resultant weakening, and possible destruction of the valuable "bottom" pasture species, such as white clover, crested dogstail, and Poa trivialis. Further, pastures cut for ensilage in November produce much more fresh leafy feed during the remainder of the season than similar pastures cut for hay at about Christmas or New Year, or than pastures which become rank and which are not cut at all.

Ensilage-making should much more frequently be looked to as a means towards proper pasture management, and this particularly if top-dressing has been carried out. There has been a marked recent increase in the amount of fertilizer applied to grassland; in some important districts the amount so utilized has doubled in the past two seasons. It can be taken as an axiom that the best accompaniment of pasture top-dressing is close grazing. Ensilage-production can be made to assist greatly in the carrying-out of close grazing of pastures, particularly during the critical November-December period. Extra fields closed for ensilage remove the danger introduced by the oversupply of feed which is apt to occur if an attempt is made to handle the growth by the same number of stock as was carried earlier in the season.

Intensive grazing and "topping" of pastures were discussed last month in these notes as other means of keeping the pastures short in growth. It is necessary to bear in mind that there is a vital difference between proper rotational or intensive grazing and merely shifting the stock about. Many farmers frequently shift their stock from one paddock to another, and so in one sense they rotationally graze, but they do not practise rotational grazing as described last month, and of course they do not obtain the benefits which follow from that system.

Essential features of proper rotational grazing are (1) relatively heavy stocking for somewhat short periods and thorough eating down of the growth; (2) complete spelling of the pasture, following the heavy grazing, to allow of the development of a clean, fresh growth; (3) repetition of the heavy stocking and thorough eating-down before the growth has become long enough to bring about either waste or injury to the pasture. For instance, a field would be stocked with eight to sixteen cows to the acre until if kept longer on the field the stock would suffer; then the field would be rested until it again provides about two day's feed for stock carried at a similar rate.

Harrowing of pastures to bring about proper distribution of stock-droppings is a pasture-management measure the full value of which seems to be still but poorly appreciated. The consequence is that it is much more generally neglected than the benefits which it can confer warrant. It is essential, if full benefits are to result, to break up and distribute droppings before they have remained undisturbed for any considerable length of time. The longer they remain undisturbed the more difficult

it becomes eventually to distribute them properly. Further, as they remain undisturbed, their soluble fertilizing ingredients are washed out into a relatively small area of soil, and this results in the development of undesirable patches of rank growth thoughout the field, even when harrowing is done later.

UTILIZATION OF ESTABLISHED LUCERNE.

One of the commonest errors made in the utilization of established lucerne is to wait unduly late before mowing the first cut of the season. This undue delay frequently owes its origin to the fact that favourable haymaking weather is not experienced when the first cut is at a proper stage to be mown with the most advantage, and the pastures at that stage are making such good growth that there is nothing to be gained by cutting the growth from the lucerne-field and feeding it out in a green state to stock. The best practice, provided the lucerne-field will yield a sufficient amount of material for the purpose, is to make the first cut of the season from the lucerne-field into ensilage. In this way excellent ensilage may be usually obtained, since the first cut generally contains a considerable proportion of plants other than lucerne, such as rye-grass and annual meadow-grass, and these, mixed with the lucerne, produce high-quality ensilage.

The necessity for removing the first cut at a date earlier than that at which it is often done arises from the fact that the invading plants, which so commonly are prominent in the first growth of the season—be they worthless species or relatively useful ones such as rye-grass—are definitely doing harm to the lucerne plants present by shutting off from them a certain amount of light, and the longer these invading plants remain unmown the more are the lucerne-plants weakened. Once the first growth of the season has been mown on the lucerne-field, the invading plants are usually unable, during that season, again to shut out the light from the lucerne plants. This is because with warmer weather the lucerne gains the ascendancy in respect to rapidity of growth, whereas during winter and early spring invading plants make more rapid growth than the lucerne does at that period, and so are able to win against the lucerne in the struggle for light.

A minimum amount of about 20 tons of green material is necessary for satisfactory making of ensilage, and the first cut of the season from a thriving lucerne-field should yield from 7 to 9 tons of green material to the acre. If the lucerne-field will not yield sufficient green material for economical saving into ensilage, that which the lucerne-field yields can often be admirably supplemented with surplus growth from the pastures, which, moreover, will benefit from the early mowing.

SOIL-INOCULATION FOR LUCERNE.

The lucerne crop, in a most interesting manner, operates in conjunction with lowly soil organisms in such a way that both the lucerne and the organisms benefit. It has become the practice—and it is a sound practice—to supply the necessary organisms to the soil at or about the time of sowing lucerne. This practice is known as soil-inoculation. The farmer cannot readily find out whether the soil organism is present in his soil or not, and whether, therefore, he should inoculate or not. He can inoculate without much cost, however, and will be well advised to do so and so be on the safe side.

One of the most ready means of carrying out the inoculation is to procure from the Plant Research Station, Palmerston North, some suitable cultures of the necessary organism, which are supplied free of charge, and to follow carefully the instructions which are sent in regard to the use of the cultures.

One important point recently established by investigations carried out by Mr. W. Reid, of the Plant Research Station, is that the use of superphosphate at the time when soil-inoculation for lucerne is being carried out seriously hinders the establishment of the valuable co-operation between the lucerne and the organisms which function with it. Hence the use of superphosphate should be dropped at that time. Fortunately, at that stage basic superphosphate or basic slag may be used in place of superphosphate without danger of any injury to the valuable soil organisms. It is not to be inferred from the above facts that superphosphate should not be used with an established crop of lucerne; extended field practice has shown that superphosphate is often an excellent dressing for established lucerne.

MANGELS.

One of the most valuable special forage crops is the mangel, which, judging by the area devoted to it in recent years, is becoming more neglected rather than more appreciated. Features which give the mangel its great value are: (1) Its remarkably high yield when given good treatment; yields of 70 to 100 tons and over to the acre have occurred freely over a range of years on greatly differing farms situated over a wide range of country; no other crop will so consistently give such high production: (2) its freedom from serious attack of pests or disease: (3) its ability to withstand well a dry period during the growing season: (4) its comparatively good feeding-value per ton and its good keeping-qualities.

The fact that despite these merits the area devoted to the mangel has declined is due to some extent to this crop's special need for good treatment. Success with mangels calls not only for thorough cultivation but also for liberal use of fertilizers, to which no farm crop, with the possible exception of the potato, responds better. A good fertilizer dressing for mangels would result from applying the following mixture per acre: 2 to 4 cwt. superphosphate, 2 to 4 cwt. blood-and-bone, 1 cwt. 30-per-cent. potash or 2 cwt. kainit. Possibly 1 cwt. of sulphate of ammonia and 3 to 5 cwt. of salt could at times be added with advantage.

The salt and kainit should be broadcast and harrowed in a week or so before the seed is sown. If the heavier amount of superphosphate is used it should be so incorporated with the soil as not to come in close contact with the seedlings as soon as they have developed, otherwise injury to them will result. Mangels are sometimes sown in October, but in general there is nothing to be gained by specially early sowing, and particularly if cold wet conditions occur the earlier-sown crops may be poorer in yield than the later-sown ones. Quick germination, which the warmer later conditions favour, is of considerable importance with the mangel, especially when weeds are likely to make themselves troublesome.

To induce quick germination the seed may be soaked for twenty-four hours in water before sowing. It may be sown immediately after soaking or left for a few days, when it will germinate quickly—either way proves quite a good practice. The seed should be sown at the rate of 5 lb. to 6 lb. an acre in drills 21 in. to 28 in. apart, to allow freely of intertillage during the growing period. Of varieties it is significant that Prizewinner has always held a very prominent place in farmers' competitions when the yields came to be weighed. Other good varieties are Orange Globe, Red Intermediate, Long Red, and Jersey Queen.

CHOU MOELLIER.

Chou moellier is here mentioned mainly because it has received more attention during recent years than formerly. It is a crop which calls for high fertility—it demands a soil of the type which would suit cabbage,

If it is desired to grow chou moellier on inferior soils their fertility should be improved, and farmyard manure is a fine dressing for this purpose. If sown in October or November on fertile soils chou moellier is well adapted to provide feed in late summer. A suitable seeding is 1½ lb. to 2 lb. of seed to the acre sown broadcast, or ½ lb. to ¾ lb. in drills 2 ft. to 3 ft. apart. It responds well to liberal use of fertilizers, such as a mixture of super and blood-and-bone in equal parts; 3 to 4 cwt. of this mixture may usually be applied with profit, and such a dressing may often advantageously be supplemented with 1 cwt. of sulphate of ammonia. Chou moellier is less subject to attacks of disease than other members of the cabbage family. It is distinctly suitable for cows, pigs, and poultry. Quite a number of successful sheep-farmers favour it for carrying sheep through the winter. It will not fatten lambs as well as rape.

IMPLEMENTS.

All implements and equipment that will be in use during the saving of hay and ensilage should be made ready for immediate use well ahead of the time when they are likely to be put in use. Time lost through faulty implements, especially in connection with the saving of hay, at times proves very expensive.

—R. P. Connell, M.A., Fields Division, Palmerston North.

FISH-TAINT IN PIG CARCASSES: A WARNING TO FEEDERS.

The pig is too often considered as an animal only useful for consuming all and sundry by-products. In this connection it is well known that the diet has a considerable bearing on the nature and quality of the meat of the carcass. The nature of the fat is a highly important factor, and is an indication of the quality of the carcass as a whole. The fat should be firm, white, and even, but that it is readily influenced by the diet may be instanced by the effect of an excess of maize in the ration. Maize is a badly balanced food, being very rich in starch and poor in protein, and when given in a large proportion (say, over 60 per cent.) it produces a carcass with heavy oily fat unsuitable for pork or bacon.

In this country a large number of pigs are fed on slops of some kind, which produce a carcass of lower quality than the grain-feeding. These slop-fed animals require the addition of some meal to their ration to assist the growth and fattening process. In a number of cases of late fish-meals or proprietary preparations containing whale-oil have been used instead of, or in addition to, purely cereal meals, and it is the indiscriminate use of these fishy foods that has largely contributed to the recently reported fish-taint in New Zealand pig carcasses. Pure white fish-meal of known quality and standard is an excellent food, but is not always readily obtainable with a guaranteed analysis, which latter is essential for maintaining a balanced ration. The tendency of these meals is to contain an undue proportion of the offal from fish-shops, which is very rich in the heavy "liver" oil giving the taint.

The two important constituents that must not be in excess in fish-meal are salt and oil; an average of 2 per cent. and 3 per cent. are a suitable proportion, but never more than, say, 4 per cent. or 5 per cent. It must be remembered that, bulk for bulk, fish-meal weighs practically twice as much as any cereal meal, and a farmer may unknowingly be feeding his pigs on, say, 20 per cent. of fish-meal instead of 10 per cent., with the result that the stoppage of the meal a few weeks before killing does not have the desired effect.

Farmers are therefore recommended to discontinue the use of these foods for three months before slaughter, carrying out the change gradually so as

not to check the fattening-process. The feeding of grains, where obtainable, is recommended both to increase the general quality of the flesh and to overcome the taint. Experiments are now being carried out by the Department of Agriculture with a view to determine up to what period before killing fish-oils, &c., can safely be fed without tainting the carcass, and the results will be made known to farmers in due course.

—*Live-stock Division.*

THE ORCHARD.

CARE OF THE TREES.

YOUNG trees planted during the dormant season and last year's grafts which have been pruned will require an occasional inspection for the purpose of suppressing badly placed or unnecessary shoots. The future symmetry of the head depends upon setting a good foundation, and if the growth is limited to only those shoots which are well placed, future prunings will be simplified and growth stimulated in the desired direction. It frequently happens that two shoots will arise from a common base, in which case one should be removed to prevent the formation of a fork with an acute angle which will be liable to split when supporting a crop of fruit. Young grafts should be watched for the first appearance of *Captoptes obliqua*, the greyish beetle which feeds on the young growth, showing a preference for the shoots coming from the graft. Arsenate of lead does not appear to be a satisfactory control, and hand picking once or twice daily is necessary in districts where this pest is troublesome.

SPRAYING.

Apples and pears must be kept under observation to ensure making the first arsenate-of-lead spray for codlin-moth control at the correct stage of development. Each variety must receive attention when approximately three-quarters of the petals have fallen. To strike an average over the orchard may result in catching some trees at the right time, others not sufficiently advanced may be set badly, due to injury to the pollen, and the early-flowering ones may have advanced to the stage where the calyx lobes have closed in and covered any eggs which may have been laid.

Black-spot may be expected at any time, and close adherence to the spray programme during periods of moist, humid atmospheric conditions is essential. Black aphis will be active on stone-fruit, and should receive an application of Black Leaf 40. These insects increase very rapidly, and further applications at short intervals may be required. Wood-production for next season's crop can be seriously retarded by them.

Brown-rot control will bulk largely in the spray programme from now on. As an adjunct to spraying, the fruit should be thinned sufficiently to allow each one to reach maturity without touching its neighbour. Where fruits are in contact, moisture sufficient for the germination of Brown-rot spores is held for a longer period than where the fruit is exposed, and control is rendered more difficult. Spraying with sulphur paste or dry-mix should be done about three weeks after fruit has set, and then at three-weekly intervals until shortly before picking, but washing of the spray off the trees by heavy rains may necessitate more frequent applications.

In spraying it is not sufficient to apply the spray until the tree drips. That can be done by standing in one position, but to wet every portion it is necessary to keep moving round the tree, and if every portion does not receive its share good results cannot be expected.

FIREBLIGHT.

Frequent inspection of apple, pear, quince, and hawthorn trees should be made for any appearance of fireblight, and immediate action taken to

minimize the spread. The brown, dried appearance due to pear-slug on hawthorn and pear-leaves frequently leads those unacquainted with the appearance of fireblight to suspect the presence of that disease, but any suspected cases should be immediately reported to the district Orchard Instructor for investigation. The sudden death of the tips of young shoots, to which the foliage adheres, assuming a brownish colour similar to the result of scorching, will call for closer examination, and the contrast between the healthy portion of the tree and the diseased area will facilitate detection. Cutting out and burning all infected portions should be done immediately the disease appears.

SPRING PLOUGHING AND MANURING.

If spring ploughing has been delayed it should be completed at the earliest opportunity and the disking or harrowing proceeded with. Late ploughing in dry weather, by checking the root-action, will sometimes seriously interfere with setting or cause a heavy drop of young fruit.

Where nitrates are required they should be applied during the coming month, before the dry weather sets in and minimizes their efficiency.

Citrus-culture.

Cultivation should now be well advanced, and frequent light surface stirrings to keep weeds down and maintain a fine tilth will be all that is required.

When the main blossoming of lemons is finished, and the young fruit is showing, a 4–4–40 bordeaux spray for the control of verrucosis should be applied. This disease, if permitted, will infect the young leaves and thus carry over through the season, infecting young fruits and producing the rough scabbed condition which greatly reduces their value.

All ripening fruit should be picked as soon as ready, so as to allow full development of the new season's crop. If allowed to remain and fully ripen on the tree this fruit becomes coarse, thick in the skin, with a very low juice content, and consequently of low commercial value.

Any sickly trees should be closely examined and the trouble diagnosed. The most frequent causes of debility are red scale and collar-rot. Scale is readily detected, and an oil spray followed by manuring with nitrate of soda will stimulate growth. Collar-rot will entail a more thorough examination. The soil should be removed from round the stem and the base of the main roots exposed. The disease causes the bark to rot, commencing at or below the ground-level, and if unchecked will ring-bark the tree and cause death. Deep planting and bad drainage are frequent causative agents, and very often the initial infection can be traced to injuries by spade or hoe during cultivation. The diseased bark should be completely removed, cutting back into healthy tissue, after which the wound and surrounding bark is painted with bordeaux paste or neat lime-sulphur. In large trees where a considerable area is involved it is advisable to plant one or two seedling oranges close to the trunk for inarching or grafting by approach to bridge the gap in the sap-conducting vessels. The practice of heaping lawn clippings and fowl-house scrapings around the stems of lemon-trees is conductive to collar-rot attack, as is also permitting water to lodge round the stems.

Young borers will now be active, and can be located by their fresh castings. The most satisfactory method of control is to inject benzine into the holes and then plug them with soap.

Probably no fruit shows such wide variations from the most desirable types in habit of growth, quality, and productiveness as is found in the citrus family. It will be found that some trees are prone to producing coarse rank growth, a large proportion of cull fruit, too many thorns, or other

equally undesirable features. When these failings are definitely established it will be found advisable to head the tree back sufficiently to cause it to produce young shoots from the best-placed limbs. These can be worked over with buds taken from a tree of better type, and the old portions removed as the new growth increases. It is necessary to paint all large wounds as a protection against fungoids. In selecting buds it is advisable to choose fresh round wood, with well-developed eyes free from thorns, on a twig which has produced fruit. Strong vigorous shoots should be avoided. Budding may be done during October or early November, or deferred until the bark lifts freely in the autumn. If the work is done in the spring the shoots may be headed back to the bud by Christmas-time and good growth produced by the autumn, but the latter ones will stand over and be headed in the following spring.

—G. H. McIndoe, Orchard Instructor, Auckland.

POULTRY-KEEPING.

LATE HATCHING.

With the heavy cost of production at present facing the poultry-keeper it will only be in those exceptional cases in which specially favourable conditions are present that it will pay to hatch November chicks. Therefore, if more chicks are required there should be no delay about it, for the later the hatching the lower will be the productive capacity of the flock.

DUCKS FOR THE FARMER.

There is still ample time to hatch out the laying type of duck. The keeping of a small flock of ducks is a matter which should appeal particularly to farmers and small settlers, for it is on farms and small holdings where a good range is available that a maximum profit can be made from a flock of high-type layers. It may be said that ducks are heavy feeders, and with the present high cost of food will return a poor margin of profit over their keep. This may be true where the whole of the food they require has to be purchased. On the farm, however, it is entirely different, for where a free range is available, and particularly where there are creeks or the land is swampy, ducks will at most times of the year themselves find a great deal of the food they require.

Probably the two most popular breeds of duck in New Zealand at the present time are the Indian Runner and the Khaki Campbell. The latter can be regarded as a much better dual-purpose breed than the former. Both of these breeds are good foragers, and when given their liberty the worms, snails, and other forms of insect life, combined with green material picked up, make an ideal food for promoting egg-production.

Compared with fowls, the cost of accommodating ducks is much less. In most parts of New Zealand they do not need houses; a low wire-netting fence about 2 ft. high erected in a dry, well sheltered locality is all that is required. This is merely for the purpose of yarding the birds by night. Owing to the fact that ducks usually lay their eggs at that time, and drop them anywhere, the work of collecting would be a troublesome matter were the birds not enclosed, to say nothing of the eggs that are likely to be lost. If the birds are kept penned until about 10 a.m. few if any eggs will be laid later. Ducks are creatures of habit, and if given a good feed at a regular time in the evening they can generally be depended upon to come home, when they can be penned up for the night.

FEATHER-PULLING.

Several inquiries have reached me lately with regard to fowls losing their feathers. In some cases it is regarded as an unreasonable moult

setting in, and in others the owners of the birds are at a loss regarding the cause. It is, however, a matter of feather-pulling and nothing else. This is a bad habit, and is usually the result of confined quarters, insufficient exercise, and the presence of vermin, the latter in most cases being responsible. The particular class of parasite that causes this trouble makes its home about the roots of the feathers, and causes intense irritation of the skin. The fowl, in order to rid itself of the irritation caused by the insects, may pull out the feathers herself, but generally invites her mates to do so. There is practically no cure for this trouble, and the only way of fighting it is to prevent it, or, if possible, to remove the cause, for once the majority of the birds in a flock acquire the habit it is a difficult trouble to overcome.

It is commonly stated that an ample supply of animal food, frequent changes of diet, or adding flowers of sulphur or salt to the morning mash will have the desired result. I have seen all these tried, but without success. In fact, in the worst case of feather-pulling I ever saw the birds were given as much boiled meat as they could eat at all times. The only proper treatment of this deplorable habit is to remove the cause, and the first essential is to provide ample range. Where this is available feather-pulling is practically unknown. Constant warfare must be made on vermin by keeping houses clean and giving them a frequent spraying with a strong disinfectant. Good dust-baths must also be provided. While the best way of fighting vermin is to prevent them from making their appearance, this is sometimes more easily said than done, as even under the best of management they are apt to give a certain amount of trouble. This being so, the combination of preventive and curative methods may be found necessary if the flock is to be kept free from parasitic infestation.

The value of Black Leaf 40 (a by-product of tobacco) for freeing fowls of all kinds of insect pests is not by any means appreciated by poultry-keepers as much as it should be. From 2½ lb. to 3 lb. of this preparation is sufficient to free one thousand birds of any lice that may be upon them. The material for this number can be effectively applied in about fifteen minutes, and the following is a good method of doing so. Make a small hole in two opposite corners of a small tin containing the material, and pass it along each perch, leaving a thin line of the liquid on the perch. Do this at dusk, just before the birds go to roost. Do not dilute the material with water, or it will not have the desired effect. For the treatment to be really effective it is important that all birds should go or be placed on the perches, and not allowed to roost in odd corners of the house. If there is much dust on the perches the liquid is apt to run off and be wasted, and to prevent this it is a good plan to first rub the perches over with a damp cloth. If this is done the liquid can be more easily applied to the centre of the perch, and the risk of wastage will be reduced to a minimum. This treatment is rapid in its effect, for if the birds are examined, say, twenty minutes after the perches have been so treated, practically every louse will be dead and will be found on the tips of the feathers. Birds that are in broody-coops, single pens, &c., may be freed from vermin by dipping a feather into the liquid and drawing it under both wings, or by putting a small amount between the breast-feathers. Black Leaf 40 is sold in liquid form, in various-sized tins, by vendors of orchard sprays and others.

It goes without saying that where feather-pulling is giving trouble, due to the presence of vermin, Black Leaf 40 will prove invaluable. Indeed, many instances have lately come under my notice of poultry plants where feather-pulling in the past had given endless trouble being absolutely cleaned up since the birds have been treated for lice with this nicotine preparation.

—F. C. Brown, Chief Poultry Instructor, Wellington.

THE APIARY.

SWARMING.

By November, if the weather conditions are favourable, swarming should be in full swing throughout the Dominion. Therefore it is most important that the beekeeper should note the condition of his hives in ample time to decide which colonies are to be allowed to swarm. Excessive swarming is often accepted by beginners as a proof of prosperity, but this cannot be regarded by any means as an established fact. Only strong colonies headed by young vigorous queens should be allowed to swarm, and in many cases it will be found that these colonies show little inclination to do so. Where a colony of moderate dimensions persists in making preparations for swarming it should be requeened from better stock at the earliest opportunity.

When a strong colony swarms, the swarm should be hived at once into a clean box, in such a manner that the bees may pass in and out of the box easily, and be left there till towards evening. By that time a hive should be prepared containing frames fitted with full sheets of foundation, and, if necessary, a feeder, the hive being placed on its permanent stand. Late in the afternoon the hive-body should be raised from the bottom-board and a clean sack laid on the alighting-board and surrounding ground. The bees should be dumped from the box on to the sack, when they will crawl into the hive.

If honey is not coming in freely, or if bad weather supervenes, the swarm must be fed with syrup prepared from sugar and water, in the proportions of one to two, so that the bees may commence comb-building at once. Excellent combs are made from sugar-syrup, and within two or three days the bees should have drawn out several combs and the queen be busily engaged filling the cells with eggs. The bees in a swarm are prepared for comb-building, and will simply waste much wax if placed at once on drawn-out combs.

If the beekeeper has any reason to suspect the hive from which a swarm issues to be diseased, he should leave the swarm in the box into which he has hived it for at least three days, in order that the bees may use up the honey they will have brought with them when they left the parent hive.

After the swarm has issued the parent hive should be thoroughly examined, so that the queen-cells may be removed. Every cell except two of the best should be taken away. Where the hive contains particularly good stock, and the queen-cells are large and ripe, they may be carefully preserved and placed in nuclei for the purpose of queen-raising. Very often the best queens in the apiary are procured by this means. When the swarm has been placed in its permanent hive the frames should be carefully covered by good mats. Neglect of this precaution, even for two or three days, will often result in the bees building comb right into the roof, especially where gabel roofs are used, thereby wasting much good material as well as making the hive difficult to open.

AFTER-SWARMS.

It often happens that in spite of all precautions strong colonies will throw an after-swarm within a few days of the issue of the prime swarm. Sometimes the prime swarm will be delayed by bad weather, in which case the bees may have kept the virgin queens in their cells until the laying-queen has left the hive, only to liberate them immediately after, and before the apiarist has time to examine for queen-cells. These queens, being small and quick-moving, are very difficult to detect, and will probably escape notice altogether. In this case the after-swarm may follow very

quickly after the prime swarm. Occasionally, too, a few queen-cells may be missed in cutting out. If they are built, as frequently happens, on the edge of the comb against the side of the frame they are very easily overlooked.

After a little observation an after-swarm can often be detected by its behaviour. A laying-queen is heavy with eggs, and will usually seek a resting-place without delay and without venturing too high from the ground. Sometimes, indeed, she falls to the earth, and the bees will be unable to find her and will return to the hive. However, she will usually alight in some convenient spot, and the bees will cluster round her with amazing rapidity. When the hives are scattered instead of being in regular rows, a beekeeper working in his apiary at a distance from a swarming hive may miss the whole operation of the issuing of a prime swarm unless the noise attracts his attention, so quickly, as a rule, do the bees settle with a laying-queen.

With one or more virgin queens in a swarm matters are usually different. The queens are small and light, and will often soar to a considerable height, choosing their own time about settling. If there are two or three queens in a swarm there will probably be as many divisions in the cluster, so that instead of forming one compact heart-shaped mass the swarm may hang for a considerable time in several peaks. Care should be taken to see that every section is shaken into the box.

A simple method of dealing with after-swarms is to place an excluder between two empty hive-bodies, the lower of which rests on the ground or a bottom-board. Shake the swarm on to the excluder, when the bees will go through the holes in the excluder, and the queens may easily be distinguished and removed. When the queens are gone the bees will return to their parent hive, and the queens may be utilized for replacing old and failing queens. There need never be any doubt as to the advisability of taking every queen from an after-swarm—there will inevitably be one queen left in the hive for the bees to return to.

—E. A. Earp, Senior Apiary Instructor, Wellington.

HORTICULTURE.

TOMATOES UNDER GLASS.

In the cool greenhouse the tomato crop will now commence to ripen, and the house is nearly filled with tall plants growing in close-ranked files. Thus there is very little air left for circulation, and it quickly becomes overcharged with moisture from the transpiration of the relatively large mass of foliage. Under such conditions and with the rising temperatures at this season of the year the position becomes difficult for the tomato-plant, which loves a buoyant sunny climate. This method of crowding tall plants into large houses requires very careful manipulation to mature a big crop successfully. Houses that are allowed to attain a high temperature and humidity in the morning and are then thrown open to a cold draughty wind will suffer severely by being chilled. Others with insufficient ventilators at the ridge to allow the hot humid atmosphere to escape will also suffer from the unsuitable conditions, which are so conducive to the development of mould fungus.

Those who have charge of these houses will need to rise early in the morning during fine weather to open the ventilators before the temperature rises much over 70° F., and ample opportunity should be afforded in the roof of the building for thoroughly ventilating the house at this season if the crop is to be profitable. Prompt attention will also be needed when cold winds occur, as they do occasionally in some localities, to shut off the

cold draught that is then liable to blow through the house. Such attention as this will contribute a great deal to the steady swelling and ripening of the crop, which will then be of good colour, size, and flavour, and compare very favourably with the slow development that is experienced when the foliage is crippled with disease or the plants checked by chilling.

Such a closely planted crop under cover in a warm atmosphere requires a considerable amount of water. In some instances this is amply supplied naturally in the form of a high water-level in the subsoil, upon which the plants can draw; in many cases, and especially where the subsoil is inclined to be rather dry, artificial watering will have to be done. The water should then be applied generously during the evenings at necessary intervals. In such cases the requisite condition will best be maintained by applying now a surface mulch of strawy stable manure or its equivalent. This treatment will be facilitated, and the bottom bunch will colour quicker, if the lower leaves, which will now have become ragged and practically ceased to function, are removed and carried out and destroyed. They should be trimmed off to a height just above the bottom bunch.

THE OUTDOOR TOMATO CROP.

Preparation of the land for the outdoor crop has been somewhat difficult this season owing to the heavy rainfall in most districts, and especially is this the case in soils rather deficient in humus through the neglect of cover-crops for ploughing in. Where this has been done and suitable intervals of fine weather chosen for cultivation, the condition of the land is a pleasing contrast to that where the grower has been unable to give it the necessary treatment and observe the same care in choosing the time for ploughing and working the soil.

The necessary artificial manures having been applied, the plants should now be set out as soon as they are ready and the weather is suitable. Patchy unprofitable crops are often due to a mixed lot of plants being put out, in which case the result will naturally be similar. As far as possible good even plants that have been grown without a check should be planted, rejecting all that are blind, small, and untrue to type. Careful culling of the plants at this stage will go a long way in obtaining a successful crop. It is better to plant a smaller area in this manner, if necessary, and use the spare ground for another purpose. Set the plants deep and firm, and follow up with frequent light cultivation in fine weather to suppress the weeds and maintain the steady growth that is necessary to obtain strong healthy plants and early cropping.

SMALL FRUITS.

The Cape gooseberry is a popular fruit, and profitable on the right class of soil. Light rich soil in a warm locality will produce heavy crops with comparatively little risk or trouble. The plants may be set out now 3 ft. apart and 6 ft. between the rows.

The busy berry harvest will now be commencing with gooseberries and strawberries; following on come the raspberries, currants, and loganberries. These useful and delicious fruits should receive more attention from the grower as well as the consumer; with a wider distribution and a little timely advertising the consumption could doubtless be increased to a very great extent. Finer crops of this class are nowhere grown, and many of the packages in the markets demonstrate the fact in an admirable manner. Some growers, however, do not exercise the necessary care in selection and packing, and depreciate prices to the detriment of other shippers, checking consumption by disappointing the consuming public who buy. Trading and consumption would improve greatly if this were discontinued. The greatest care and good taste is necessary in presenting these goods; they must be dry and cool when picked and kept out of the

sun. Undersized and misshapen or damaged fruit or berries too ripe for travelling but suitable for preserving should not be mixed with dessert fruit. Pickers must be carefully instructed and supervised regarding this matter, or a few overripe or defective berries will seriously depreciate the appearance and value of a consignment. If this is done and if the fruit is packed in clean crates and promptly shipped there is room for a greater supply of these very attractive delicacies.

THE MARKET-GARDEN.

As in most other sections, at this time of the year weeding and cultivation to promote growth and free the crops from the competition of weeds is of first importance. If fine dry weather is chosen and weeds are not allowed to grow to any size the work is easy and large areas are quickly dealt with.

Among the half-hardy vegetable crops being planted now—cucumbers, marrows, pumpkins, and dwarf and runner beans—the beans might well receive more attention in the warmer districts. They are in demand in both a green and dried state, and they are rightly regarded as important articles of diet. For imported dry beans we spend over £8,000 per annum, in addition to freights and general transport charges; of this quantity the greater part could be grown in this country if more attention was given to the crop. Both kinds require a light, rich, well-sheltered soil, and should be sown much thinner than is the usual custom here; 6 in. between the plants and 2½ ft. between the rows for the dwarf beans is suitable spacing. Runner beans may be grown 3½ ft. between the rows if they are grown without staking.

The harvesting of asparagus and rhubarb should be brought to a close during the month of November, in order to enable the plants to recover and form strong crowns for another season. A further dressing of fertilizers and manures now will greatly assist them in doing this and greatly increase the following harvest.

Tobacco-culture.

If the tobacco-plants are well hardened off and properly set in a well-prepared field they will soon become established. Careful supervision should then be given to replacing blanks as soon as they occur, also by cultivation in fine weather to keep down weeds before they attain any size, and to break the surface crust after rain. A fortnight after planting, when the plants are well established, the remainder of the manures mentioned in the last month's notes should be applied. This is sometimes done by moulding the plants up with a hand-plough, distributing the fertilizers in the furrow made, and covering them immediately afterwards.

A good early even crop depends very much on the supervision and attention given now so that the plants make steady growth when the conditions are favourable. Without such care they receive a check which delays the growth and is only corrected with difficulty under weather conditions that are generally less favourable for the purpose.

—W. C. Hyde, Horticulturist, Wellington.

Chewings Fescue Seed.—The experiments commenced by the Seed-testing Station in 1928 in dusting Chewings fescue with Semesan to overcome loss in vitality in storage or transport overseas are being continued, six parcels having been sent to Washington and Cambridge during the year 1928–29. Tests made at those places and at the New Zealand Station have shown so far that the treatment has in no way checked losses in vitality.

TESTING OF PUREBRED DAIRY COWS.

C.O.R. LIST FOR JULY, AUGUST, AND SEPTEMBER, 1929.

* Cow milked three times daily during whole lactation period. † Milked three times daily during part of period.

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
	JERSEYS.					
Junior Two-year-old.		Yrs. dys.	lb.		lb.	lb.
Wyndale Golden Girl	A. O. Brown, Kamo ..	1 290	240·5	365	9,091·0	503·44
Glenview Emerald ..	G. Bulte, Waiuku ..	2 56	246·1	335	7,202·8	435·42
Silverstream Sky ..	G. B. Hull, Silverstream ..	1 335	240·5	365	9,062·3	426·77
Waiwetu Fairy Rose	A. J. Miller, Uruti ..	1 341	240·5	302	8,258·0	421·69
Velebit Mistressful ..	A. J. Kidd, Waiuku ..	1 352	240·5	299	8,686·4	406·53
Bethune Nelda ..	A. S. W. Hazard, Waimate North	1 235	240·5	365	7,234·0	401·73
Brooklyn Gaiety ..	H. J. Lancaster, Palmerston North	1 334	240·5	285	7,089·4	383·83
Otterburn Ringlet ..	E. J. Mears, Hamilton ..	1 363	240·5	348	5,973·2	373·95
Mildred of Tamahere	F. S. Veale, Cambridge ..	1 285	240·5	356	6,516·4	372·36
Perfection's Golden Lady	Mrs. A. Jagger, Papakura ..	1 348	240·5	308	6,642·1	364·62
Patchwork of Ivry ..	H. W. Le Bailly, Buckland	2 8	241·3	365	6,993·0	363·16
Mt. Kowhai Avoca ..	R. J. Johnston, Runciman ..	1 360	240·5	351	5,475·4	345·61
Park Farm Tootsie ..	H. Garlick, Makomako ..	1 349	240·5	334	6,354·8	342·09
Homeside Mayflower	H. Rogers, Pukekohe ..	1 316	240·5	317	6,014·6	328·98
Jewel of Tamahere ..	F. S. Veale, Cambridge ..	1 302	240·5	311	5,408·6	326·15
Te Aute Tinsel's Eileen	Miss E. Busby, Tokomaru Bay	1 332	240·5	285	5,708·2	323·61
Te Rangi Duchess ..	W. Hazlewood, Northcote ..	1 331	240·5	365	6,260·4	312·28
Sunflower's Sun Queen	W. C. Mears, Ngarua ..	1 362	240·5	280	4,482·4	312·22
Sweet Music ..	T. E. Churches, Dargaville ..	1 336	240·5	331	5,571·7	304·74
Hilton Mermaid's Beauty	Mrs. M. A. Wright, Tirau ..	2 43	244·8	275	5,008·7	286·73
Hilton Early Dawn ..	Mrs. M. A. Wright, Tirau ..	2 50	245·5	287	4,894·5	286·31
Little Bush Viola's Peggy	J. J. Springgay, Gisborne ..	1 275	240·5	324	4,845·6	284·08
Restholme Wai ..	J. J. Goodwin, Morrinsville	1 341	240·5	295	5,344·5	281·82
Star Baby	H. W. Le Bailly, Buckland	1 307	240·5	365	5,593·1	263·60
Hilton Evening Star	Mrs. M. A. Wright, Tirau ..	1 339	240·5	307	4,813·7	262·86
Conandale Flush Kity	S. Dale, Fairlie	1 264	240·5	244	4,079·2	249·36
Senior Two-year-old.						
Silver Mahone ..	G. S. B. Morrison, Maungatapere	2 307	271·2	365	11,502·7	665·94
Kahuwera Lena ..	J. V. Mortensen, Piopio ..	2 290	269·5	365	9,640·8	507·58
Marshlands Sunflower	W. C. Mears, Ngarua ..	2 207	261·2	365	6,793·0	414·40
Rosedale Bronzewing	E. J. Adams, Puni ..	2 356	276·1	365	8,806·0	414·33
Falconite Maggie ..	G. Bulte, Waiuku ..	2 325	272·9	365	6,858·2	411·91
Kapuna Belle ..	J. Davies, Maxwelltown ..	2 328	273·3	314	6,833·7	383·66
Three-year-old.						
Sungleam Radiant ..	R. W. Ferris, Masterton ..	3 166	293·6	365	11,512·3	596·87
Fairy Meadows Uranium	A. Hazelton, Waihou ..	3 330	310·0	365	9,526·1	544·27
Illston Daisy Bell ..	W. Robinson, Patumahoe ..	3 190	296·0	365	6,995·9	436·65
Fairy Meadows Beauty	A. Hazelton, Waihou ..	3 352	312·2	343	7,803·6	421·38
Mission's Princess ..	Mrs. M. A. Wright, Tirau ..	3 37	280·7	311	5,635·1	327·09

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
	JERSEYS—*continued.*	Yrs. dys.	lb.		lb.	lb.
Four-year-old.						
Illston Necklace ..	W. Robinson, Patumahoe ..	4 315	344·9	365	13,074·9	713·57
Marairohia Treasure ..	W. Craig, Waiuku ..	4 1	313·6	365	12,173·1	686·42
Beechlands Welcome Lady	A. Hazelton, Waihou ..	4 361	349·6	342	8,307·7	573·58
Linden Grove Silverlink	A. Hazelton, Waihou ..	4 265	340·0	365	6,918·8	483·25
Linden Grove Ayesha	A. Hazelton, Waihou ..	4 331	346·6	343	7,496·6	449·71
Rockview Fox's Beauty	W. H. Fitness, Rehia ..	4 356	349·1	308	7,703·4	440·30
Mature.						
Cloverlea Snowdrop ..	W. A. Guy, Matapu ..	6 333	350·0	329	10,177·7	537·68
Kahuwera's Wee Lass	J. V. Mortensen, Piopio ..	8 255	350·0	365	10,269·8	506·20
Rockview Machree ..	W. H. Fitness, Rehia ..	5 307	350·0	365	10,257·3	492·64
Hillcrest's Nova Aquilae	H. S. Fleming, Clevedon ..	10 23	350·0	262	8,788·3	471·03
	FRIESIANS.					
Senior Two-year-old.						
Princess Lady Sylvia*	G. G. McRae, Waimate ..	2 286	269·1	365	12,632·3	374·14
Rosevale Rhoda Sylvia	W. Bryant, Otokia ..	2 229	263·4	308	9,515·1	287·37
Senior Three-year-old.						
Glen Iris Flower Girl†	Oakview Stud Farm, Auckland	3 305	307·5	336	14,803·6	539·44
Senior Four-year-old.						
Conemaugh Queen of Grotcholm 2nd†	Oakview Stud Farm, Auckland	4 320	345·5	365	20,342·7	664·98
Abbekerk Dutchland of Oakview†	Oakview Stud Farm, Auckland	4 225	336·0	365	16,766·2	572·23
Coldstream Bess Pietertje	E. W. Hancock and Son, Cardiff	4 362	349·7	283	11,304·7	467·96
	MILKING SHORTHORNS.					
Senior Two-year-old.						
Vale Royal Daphne's Esau	Simms and Sons, Halswell ..	2 321	272·6	365	11,319·3	496·04
Junior Three-year-old.						
Hauruia Rose ..	A. L. Souter and Son, Waerenga	3 11	278·1	343	11,513·1	468·60
Matchless Edna May Cole	A. Park Horne, Buckland ..	3 44	281·4	284	9,423·5	398·23
Mature.						
Riverdale Grace III†	T. W. Wardlaw, Waimana	7 287	350·0	320	15,832·4	629·36
Bushcroft Fairy ..	H. Bond, Rangiotu ..	6 245	350·0	281	8,167·6	358·00
	Second-class Certificates.					
	Jerseys.					
Mature.						
Lyndon Daisy ..	R. J. Johnston, Runciman ..	5 168	350·0	365	7,588·5	376·31

—Dairy Division.

NAURU AND OCEAN ISLANDS PHOSPHATE.

WORKING OPERATIONS AND SHIPMENTS.

A REPORT by Mr. A. F. Ellis, C.M.G., New Zealand Commissioner, British Phosphate Commission, is embodied in the Annual Report of the Department of Agriculture for 1928–29, as under :—

"The ninth year of operations at Nauru and Ocean Islands under Government ownership terminated on 30th June, 1929, with the following results as regards phosphate shipments, compared with the previous year :—

	Eighth Year (1927–28). Tons.	Ninth Year (1928–29). Tons.
Nauru	310,990	342,770
Ocean	190,925	233,820
	501,915	576,590

Bill-of-lading figures are taken in each case. An increase of 74,675 tons in quantity shipped will be noted, but falling short of our previous highest year (seventh year) by 16,750 tons. The latter year was one when particularly favourable conditions were experienced at the islands as regards weather, freedom from epidemics of sickness, labour difficulties, &c. The year just ended was what may be called a normal year, in that bad weather was experienced during the months when it is due, and the usual difficulties with shipping were encountered, though we were fortunate in not having any of the moorings carried away. When the fine season started rapid progress was made, and in May a record month's work was established—viz., Nauru, 44,500 tons; Ocean, 23,825 tons: total, 68,325 tons. The previous best month for Nauru was 41,931 tons, shipped in June, 1928.

As regards phosphate dried and stored ready for shipment, the ninth year constitutes a record, the figures for the last three years being as follows :—

	Seventh Year. Tons.	Eighth Year. Tons.	Ninth Year. Tons.
Nauru	326,695	332,230	346,764
Ocean	255,362	195,900	251,749
	582,057	528,130	598,513

In this connection it may be noted that under present conditions Ocean Island has no chance of an increased output owing to the phosphate-workings becoming more restricted each year through the difficulties in acquiring further lands. There is, however, reason to think the matter will be settled within a few months.

Importations into New Zealand of Nauru/Ocean phosphate and phosphate from outside sources of supply for the last three years (by the Commission) are as follows :—

	Seventh Year. Tons.	Eighth Year. Tons.	Ninth Year. Tons.
Nauru/Ocean	139,535	136,718	138,053
Outside	10,415	42,946	29,288
	149,950	179,664	167,341

With regard to the percentage of Nauru/Ocean output coming to New Zealand, figures for the last three years are as follows: Seventh year, 21·95 per cent.; eighth year, 24·76 per cent.; ninth year, 24·66 per cent We could have supplied a further cargo this year, but it was not convenient for the manufacturers to take it, owing to their storage-bins being practically full, and it was accordingly diverted to Australia."

The report concludes with a detailed table of shipments from Nauru and Ocean Islands for the year 1928–29. This shows that of the total of 576,590 tons of phosphate shipped, 434,395 tons (75·34 per cent.) went to Australia, and 142,195 tons (24·66 per cent.) to New Zealand.

WEATHER RECORDS: SEPTEMBER, 1929.

Dominion Meteorological Office.

GENERAL NOTES.

THIS year we have experienced the coldest September for a considerable time. All parts of the country report low average temperatures, and frosts were unusually numerous. Although cold, the month was a sunny one, there being numbers of beautifully fine days. Rainfall was, on the whole, below average. This was almost generally the case over the North Island, except about Wellington. In the South Island, both east and west coasts experienced a dry month, but Stewart Island, Southland, and much of the central portions of the Island had more than the normal fall. The low temperatures gave a distinct set-back to growing vegetation, and at date feed is rather short in most districts. Parts of the North Island escaped the severity of the storms and are in good condition.

The storms recorded during the month were in no case responsible for any very heavy rains except at a few isolated places. Snow, however, fell frequently, especially in the high country of the South Island. In the interior of Canterbury it has been one of the worst seasons on record for snow.

The tendency for storms to take on cyclonic form was again in evidence during the month. Subtropical waters to the north and north-east have been unusually frequently disturbed by storms of this type.

On the 1st a deep depression of the southern or westerly type was approaching the Dominion. A small cyclonic centre developed in its northern portion, and this crossed Canterbury on the afternoon of the 2nd. Heavy north-westerly gales blew in the Cook Strait region and over the South Island. The greatest severity was felt in Canterbury, and much damage was done to plantations in Ashburton County. Cold southerlies followed, gale force again being reached in places. Snowfalls were recorded in Canterbury and Otago.

Following a fine spell, another southern depression passed on the 8th. Northerly gales again blew in and south of Cook Strait. A tornado visited the Seddon district, in Marlborough. Some places reported thunderstorms.

A moderate cyclone crossed the North Tasman Sea during the period from the 10th to the 13th, passing between Norfolk Island and Cape Maria van Diemen on the last-mentioned date. Being so far north its effect was to produce fine rather than wet weather over New Zealand. When it was well to the eastward, however, on the 16th south-westerly gales were experienced.

Numbers of thunderstorms occurred on the 18th in association with the passage of a westerly depression which brought very low pressures and westerly gales to the far South. These storms were particularly severe in north Taranaki and at Murchison. Following this depression there was a severe cold snap with snow again in many parts of the South Island; some was seen also on the hills near Wellington. On the 21st a cyclone, coming from the north, appeared to the north-east of East Cape. South-easterly gales were experienced in parts of the North Island, and more snow fell in the South Island. The most severe period of the cold snap, from the 20th to the 22nd, became later the farther northward one proceeded. A very severe frost was felt in the Auckland and Thames districts on the 22nd, and great damage was done to potato and tomato plants.

A fine interval followed, but between the 24th and the 27th a series of cyclones moved from the Tasman Sea across the Dominion. Southerly gales set in from Cook Strait southwards on the 27th while the last centre

was crossing the Auckland Peninsula. A cold snap, reminiscent of that of a week previous, resulted. Snowfalls were again reported from the South Island, and hail in places. Thereafter mild and fair conditions developed.

RAINFALL FOR SEPTEMBER, 1929, AT REPRESENTATIVE STATIONS.

No.	Station.	Total Fall.	Number of Wet Days.	Maximum Fall.	Average September Rainfall.
	North Island.				
		Inches.		Inches.	Inches.
1	Kaitaia	4·05	10	1·15	4·75
2	Russell	2·64	14	0·92	4·36
3	Whangarei	2·86	20	0·53	4·91
4	Auckland	2·36	16	0·69	3·65
5	Hamilton	2·27	12	0·66	4·40
5A	Rotorua	2·20	9	0·59	5·16
6	Kawhia	3·00	15	0·86	4·32
7	New Plymouth	4·19	18	0·99	5·22
8	Riversdale, Inglewood ..	6·17	16	1·76	9·48
9	Whangamomona	6·77	13	1·16	7·15
10	Eltham	3·93	14	0·91	3·91
11	Tairua	2·70	12	1·05	4·78
12	Tauranga	2·52	12	0·70	4·41
13	Marachako Station, Opotiki	2·02	9	0·94	4·18
14	Gisborne	2·51	14	1·35	3·01
15	Taupo	1·84	7	0·61	3·82
16	Napier	1·01	9	0·68	2·19
17	Maraekakaho Station, Hastings	1·72	11	0·62	2·57
18	Taihape	2·33	16	0·59	3·44
19	Masterton	2·64	13	0·56	3·13
20	Patea	..	..	..	3·48
21	Wanganui	2·04	9	0·70	2·96
22	Foxton	1·95	9	0·72	2·43
23	Wellington (Karori Reservoir)	4·02	13	1·19	3·50
	South Island.				
24	Westport	5·61	19	1·32	6·82
25	Greymouth	6·15	21	1·21	7·96
26	Hokitika	6·58	19	1·24	9·33
27	Ross	8·29	14	1·36	13·06
28	Arthur's Pass	22·58	19	9·36	15·50
29	Okuru	11·57	16	2·50	12·48
30	Collingwood	..	..	..	10·13
31	Nelson	3·78	5	1·20	3·75
32	Spring Creek	2·10	7	0·75	2·69
33	Tophouse	7·83	13	1·65	5·47
34	Hanmer Springs	5·39	14	1·39	4·10
35	Highfield, Waiau	2·72	10	1·20	3·12
36	Gore Bay	3·24	8	1·60	3·31
37	Christchurch	1·40	12	0·58	1·79
38	Timaru	0·64	9	0·26	2·07
39	Lambrook Station, Fairlie ..	2·10	11	0·64	2·21
40	Benmore Station, Clearburn	3·64	11	1·50	2·10
41	Oamaru	0·51	5	0·23	1·69
42	Queenstown	3·49	9	1·86	2·47
43	Clyde	1·16	6	0·58	1·06
44	Dunedin	1·99	15	0·63	2·74
45	Wendon	2·47	10	0·75	2·32
46	Gore	3·82	21	0·70	2·65
47	Invercargill	4·03	23	0·60	3·11
48	Puysegur Point	9·56	26	1·35	5·53
49	Half-moon Bay	9·83	22	1·45	4·54

—*Edward Kidson, Director of Meteorological Services, Wellington, 7/10/29.*

ANNUAL SHEEP RETURNS AS AT 30TH APRIL, 1929.

TABLE I.—SUMMARY BY SHEEP DISTRICTS.

Class.	Auckland.	Napier-Gisborne.	Wellington-West Coast.	Marlborough-Nelson-Westland.	Canterbury-Kaikoura.	Otago (including Southland).	Total in Dominion.
Stud rams (entered in flock-books)	995	1,355	3,685	724	3,083	2,952	12,794
Other rams	38,866	99,642	85,361	19,612	84,180	81,876	409,537
Wethers	404,497	666,048	742,779	228,730	565,951	681,130	3,289,135
Breeding-ewes	1,545,849	3,815,250	3,459,431	777,313	3,524,607	3,485,600	16,608,155
Dry ewes	50,361	249,784	186,252	43,878	177,849	177,574	882,698
Lambs	693,603	1,966,254	1,581,426	386,695	1,471,903	1,749,182	7,849,063
Totals, 1929	2,734,171	6,795,339	6,058,934	1,456,952	5,827,573	6,178,413	29,051,382
Totals, 1928	2,380,475	6,539,179	5,562,451	1,361,043	5,539,597	5,751,065	27,133,810

TABLE II.—COMPARATIVE STATEMENT: TEN YEARS, 1920–29.

Year.	Stud and Flock Rams.	Stud Breeding-ewes.	Stud Dry Ewes.	Stud Lambs.	Total Stud Sheep and Flock Rams.	Sheep of Distinctive Breed not entered in Flock-books, and Crossbred Sheep.				Grand Total, Stud and other Sheep.
						Wethers.	Breeding-ewes.	Dry Ewes.	Lambs.	
1920	306,621	154,516	9,803	109,454	580,394	3,901,742	11,415,159	1,814,391	6,208,284	23,919,970
1921	322,144	158,608	9,513	110,428	600,693	3,634,799	11,989,180	1,336,306	5,724,053	23,285,031
1922	322,072	154,277	7,259	98,221	581,829	2,727,624	12,341,777	952,789	5,618,240	22,222,259
1923	330,055	172,843	9,013	119,749	631,660	2,551,627	12,890,160	808,919	6,199,073	23,081,439
1924	332,814	179,533	9,727	132,137	654,211	2,807,832	12,896,561	1,036,723	6,381,249	23,775,776
1925	355,579	184,744	7,867	131,485	679,675	3,063,663	13,530,479	875,899	6,398,239	24,547,955
1926	370,535	192,055	10,053	138,526	711,169	3,212,435	13,756,197	1,069,682	6,155,510	24,904,993
1927	388,274	199,219	8,644	144,867	741,034	3,074,974	14,632,511	823,047	6,377,450	25,649,016
1928	396,351	205,720	7,347	145,969	755,387	3,024,647	15,328,331	861,780	7,103,653	27,133,810
1929	422,331	219,802	7,203	156,526	805,862	3,289,135	16,388,353	875,495	7,692,537	29,051,382

TABLE III.—DISTRIBUTION OF THE VARIOUS BREEDS, AND OF CROSSBREDS, IN EACH SHEEP DISTRICT (1929).

Breed.	Auckland.	Napier-Gisborne.	Wellington-West Coast.	Total in North Island.	Marlborough-Nelson-Westland.	Canterbury-Kaikoura.	Otago.	Total in South Island.	Total in Dominion.
Stud sheep (entered in flock-books)—									
Merino	..	2	..	2	9,188	16,154	7,426	32,768	32,770
Lincoln	605	887	6,491	7,983	357	108	60	525	8,508
Romney	17,948	15,492	79,756	113,196	9,208	4,507	47,079	60,794	173,990
Border Leicester	782	..	448	1,230	338	12,177	10,276	22,791	24,021
English Leicester	924	358	26	1,308	1,597	19,843	638	22,078	23,386
Shropshire	369	..	381	750	4	2,074	1,203	3,281	4,031
Southdown	5,666	11,142	35,759	52,567	1,392	14,741	2,293	18,426	70,993
Corriedale	383	67	1,063	1,513	1,085	35,966	14,414	51,465	52,978
Ryeland	897	506	810	2,213	124	1,135	99	1,358	3,571
Other breeds	39	17	..	56	1,087	934	..	2,021	2,077
Totals	27,613	28,471	124,734	180,818	24,380	107,639	83,488	215,507	396,325
Sheep of distinctive breed, but not entered in flock-books—									
Merino	5,785	11,132	10,384	27,301	212,118	515,711	375,025	1,102,854	1,130,155
Lincoln	6,350	37,886	22,911	67,147	965	7,888	3,083	11,936	79,083
Romney	439,995	1,342,195	1,189,571	2,971,751	148,591	97,575	277,513	523,679	3,495,440
Border Leicester	3,979	3,083	908	7,970	1,955	30,680	20,786	53,421	61,391
English Leicester	3,333	1,154	1,968	6,455	11,755	57,942	3,971	73,668	80,123
Shropshire	2,585	645	1,541	4,771	2,527	6,994	3,242	12,763	17,534
Southdown	11,939	25,552	59,763	97,254	1,912	20,025	2,719	24,656	121,910
Corriedale	3,231	1,151	32,898	37,280	25,821	592,684	440,679	1,059,184	1,096,464
Half-bred	8,217	11,310	9,119	28,646	272,449	741,490	352,025	1,365,964	1,394,610
Ryeland	387	438	448	1,273	68	2,219	414	2,701	3,974
Other breeds	140	145	267	552	17	386	152	555	1,107
Totals	485,941	1,434,691	1,329,778	3,250,410	678,178	2,073,594	1,479,609	4,231,381	7,481,791
Crossbreds and others not otherwise enumerated	2,220,617	5,332,177	4,604,422	12,157,216	754,394	3,646,340	4,615,316	9,016,050	21,173,266
Grand totals ..	2,734,171	6,795,339	6,058,934	15,588,444	1,456,952	5,827,573	6,178,413	13,462,938	29,051,382

ANSWERS TO INQUIRIES.

IN order to ensure reply to questions, correspondents must give their name and address, not necessarily for publication, but as a guarantee of good faith. Letters should be addressed to the Editor.

WOODEN TONGUE (ACTINOMYCOSIS) IN DAIRY STOCK.

"VOLCANIC," Maungakaramea :—

Will you kindly inform me whether any preventive measures can be taken against wooden tongue in dairy stock, and whether an affected animal may be permanently cured by dosing with iodide of potassium? Last season I had a second calver badly affected, and this year a two-year heifer a few days after coming to profit, both animals being reared on the farm. In both cases the front teeth also became loose. I have top-dressed the farm for the past eight years with basic slag and super alternately; lime has also been applied. Do you consider I am likely to have fresh cases occurring?

The Live-stock Division :—

One cannot do a great deal, but some preventive measures should be taken against this disease just as in any other disease of a similar nature. Whenever it is suspected that an animal is affected, it should be isolated at once until the true cause is known. Some of the earliest symptoms which may be observed by the average individual are that the saliva keeps dripping from the mouth and the food is chewed in an awkward manner, the animal is unthrifty in appearance, and possibly the tongue or gums are affected. Sometimes the cheek and face are swollen—it all depends on the nature of the tissues that are diseased. Sometimes the jawbone itself is affected. All fittings with which the animal has come in contact should be thoroughly disinfected with a strong solution of any reliable disinfectant in soap and hot water, and allowed to dry, and all walls, posts, &c., given a coating of limewash or some suitable tar preparation. If an affected animal has been noticed early, then treatment with iodide of potassium internally will in many cases effect a permanent cure. The dose is 1 to 2 drams given twice daily, and continued for about a fortnight as the circumstances and results warrant. Sometimes it is necessary to repeat the treatment if the symptoms recur. Should the jaw-bone itself be affected or the disease be well established, treatment is not warranted as a rule, as it is seldom that a complete cure is effected in such old-standing cases. Externally, if treatment can be given, the local application of strong tincture of iodine will help. Top-dressing the land with burnt lime must also materially assist. You will in all probability have cases cropping up from time to time no matter what trouble you go to, but you can always do everything possible to prevent other animals eating fodder that has been soiled by discharge or saliva.

ENSILAGE INQUIRIES.

"ENSILAGE," Fairlie :—

Is Russian (black) barley a suitable crop for making ensilage? In making ensilage in a pit can it be left any time—say, when half full—and then completed?

The Fields Division :—

Black barley has been found quite suitable for making ensilage, and in your district is perhaps the best variety to grow for this purpose. The crop should not be allowed to mature, but should be cut and placed in the pit just before it starts to change colour. Control of temperature is most important in ensilage-making, and it would not do to fill your pit half full and leave it without it being weighted in some way. When the final layer is put in the temperature should be allowed to rise, as in the case of the earlier layers of green material, and then the pit should be covered so as to exclude the air. In some cases the weighting-material has been removed several weeks later when another crop was available for ensiling, and further material placed in the pit in layers of about 6 ft. deep each time; and when the pit was full weight was applied to exclude the air, and the pit covered so as to prevent rain entering.

ARSENICAL SPRAY FOR BLACKBERRY, ETC.

M. B., Awamarino :—

What proportion of arsenic and caustic soda should be mixed to make a potent weed-killer ? If kerosene were added to the mixture to make leaves of plants unpalatable to stock that might gain access to the spot, would it interfere with the killing-strength of the mixture ? It is intended to use the mixture on blackberry, honeysuckle, and lawyer, and as a pricking poison to crown of ragwort.

The Fields Division :—

A common and useful arsenical spray for blackberry is made as follows : Take 1 lb. of white arsenic, 2 lb. of washing-soda, and 1 gallon of water. Dissolve the soda in the water by boiling for fifteen to twenty minutes ; add the arsenic and boil again until a clear solution is obtained. Use one part of this solution to twenty parts of water. White arsenic can also be dissolved in caustic soda, and a satisfactory formula for mixing is as follows : Take 1 lb. of white arsenic and 1¼ lb. of 98 per cent. fresh caustic soda. Mix the white arsenic and caustic soda together dry ; then add a little water — sufficient to make a paste — stirring thoroughly with a stick ; as soon as it commences to bubble run in a little more water, but not sufficient to stop the bubbling ; when bubbling has ceased the full quantity of water may be added. Care must be taken to stir thoroughly and to keep away from the fumes, which are of a very poisonous nature. This type of spray is put up in 5-gallon drums by Murtons Ltd., Napier, and is sold at the rate of 8s. per gallon. It should be diluted from about 1 part in 90 to 1 part in 120. The spray does not entirely kill the blackberry-plants, but kills the tops and some of the crowns. The mixture is spread on the area with a knapsack sprayer, and the plants gradually wilt and dry up. Later the plant-roots send up fresh shoots, and these are left as long as possible and then the area is fired. Arsenic spray has a toxic effect on animals, and we do not think the mixing of kerosene with the spray would result in keeping the animals off the sprayed areas. Cattle are especially attracted to eat the sprayed vegetation because of the brackish sweet taste of the arsenic compound. It is inadvisable to allow stock near the sprayed area until the plants have been burnt down. After burning the vines there is no chance of poisoning.

AGRICULTURAL SHOWS, SEASON 1929 30.

THE following show-dates have been notified by agricultural and pastoral associations :—

Marlborough A. and P. Association : Blenheim, 23rd and 24th October, 1929.
Wairarapa A. and P. Society : Carterton, 23rd and 24th October.
Timaru A. and P. Association : Timaru, 30th and 31st October.
Manawatu A. and P. Association : Palmerston North, 5th, 6th, and 7th November.
Northern A. and P. Association : Rangiora, 8th November.
Wanganui A. and P. Association : Wanganui, 13th and 14th November.
Waikato A. and P. Association : Claudelands, 13th and 14th November.
Canterbury A. and P. Association : Christchurch, 14th and 15th November.
Egmont A. and P. Association : Hawera, 20th and 21st November.
North Otago A. and P. Association : Oamaru, 21st and 22nd November.
Nelson A. and P. Association : Richmond, 22nd and 23rd November.
Otago A. and P. Society : Dunedin, 26th and 27th November.
Stratford A. and P. Association : Stratford, 27th and 28th November.
Southland A. and P. Association : **Royal Show**, Invercargill, 10th, 11th, and 12th December.
Helensville A. and P. Association : Helensville, 29th January, 1930.
King-country A. and P. Association : Te Kuiti, 6th February.
Rodney Agricultural Society : Warkworth, 8th February.
Dannevirke A. and P. Association : Dannevirke, 11th and 12th February.
Tauranga A. and P. Association, Tauranga, 11th and 12th February.
Masterton A. and P. Association : Solway, 18th and 19th February.
Auckland A. and P. Association : Auckland, 27th February to 1st March.
Taranaki Agricultural Society : New Plymouth, 5th and 6th March.

REGISTRATION OF STANDARD MARKS FOR STOCK.

THE following regulations under the Stock Act were gazetted on 3rd October :—

1. These regulations may be cited as " The Standard Marks Stock Regulations, 1929."

2. Every application made under section 3 of the Stock Amendment Act, 1927, by an incorporated society for the registration of a brand or mark as a standard mark, to be used on stock for the purpose only of indicating that the said stock is, in the opinion of the society, of a standard of merit fixed by the society, or, as the case may be, is not of such a standard, or that the said stock has been tested under the auspices of the society, shall be in the form set out in the schedule hereto, and shall set out the particulars indicated in that form.

3. Every such application shall be made to the Director-General of Agriculture at Wellington.

4. Every such application shall be either under the common seal of the society or signed jointly by the president, chairman, or other presiding member of the society, and by the secretary, clerk, or other principal executive officer of the society, and in either case the personal certificate comprised in the said form of application shall be signed personally by such presiding member and executive officer.

5. The fee payable for the registration of any standard mark shall be £1 1s., and such fee shall be forwarded with the application.

6. Unless the Director-General of Agriculture thinks fit to permit more than one standard mark to be included in one application, every application for registration of a standard mark shall be made by means of a separate application form.

(Forms of application as per schedule will be made available at offices of the Agriculture Department.)

KILLINGS AT MEAT-EXPORT WORKS.

THE following table, compiled from Meat Producers Board statistics, gives particulars of aggregate killings and/or equivalent output at meat-export works in New Zealand for the past five years, ending 30th September in each case: —

Year.	Beef Quarters.	Mutton Carcasses.	Lamb Carcasses.	Pork Carcasses.	Boned Beef =Freight Carcasses.	Frozen Sundries =Freight Carcasses.	Total Equivalent in 60 lb. Freight Carcasses.
1924–25	458,549	2,224,263	4,750,164	35,753	263,738	54,961	6,438,056
1925–26	215,594	2,001,340	5,000,590	60,757	223,415	111,229	5,610,730
1926–27	184,331	2,094,354	5,381,121	74,633	242,044	69,534	5,956,708
1927–28	394,821	2,005,333	5,947,197	147,601	283,749	125,200	6,998,086
1928–29	151,115	1,751,979	5,971,557	159,297	161,597	153,331	6,152,695

Compensation paid for Stock and Meat condemned.—Compensation to the amount of £16,138 was paid out during the official year 1928–29 for 5,713 animals condemned in the field for disease under the Stock Act, and £15,086 for carcasses or parts of carcasses condemned for disease on examination at time of slaughter at abattoirs, meat-export slaughterhouses, &c., under the provisions of the Slaughtering and Inspection Act.

Cream-grading.—" The system of cream-grading on a compulsory basis, and the payment of a differential price for ' Finest,' ' First,' and ' Second ' grade cream, is now proceeding on fairly sound and uniform lines " (states the annual report of the Dairy Division for 1928–29), " and the general quality has shown some improvement during the year. On the whole cream-graders are doing consistent work. Few complaints have been received, the majority of suppliers recognizing that the old system of payment for cream irrespective of quality was unbusinesslike and not in the best interests of the industry."